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Via Electronic Mail

March 27, 2015

Ms. Anna Krasko
U.S. EPA Region 1
Mail Code: OSRR07-1
5 Post Office Square – Suite 100
Boston, MA 02109-3912

RE: Landfill and Resource Recovery, Inc. Superfund Site
Landfill Gas Flare Performance Monitoring

Dear Ms. Krasko:

Woodard & Curran has recently conducted Flare Performance Monitoring on behalf of the Landfill & Resource Recovery (L&RR) Site Settling Defendants (the "Group"). The purpose of the monitoring is to demonstrate that the flare emissions are compliant with the Rhode Island Air Pollution Control Regulation No. 22, (APCR 22) Acceptable Ambient Levels (AALs) at the landfill boundary. This letter provides the U.S. Environmental Protection Agency (USEPA) with the results of the testing and our evaluation of the data obtained.

Background

An enclosed ground flare is used to treat landfill gas collected from the L&RR Landfill, North Smithfield, Rhode Island. The flare's performance is monitored as described in the Post Closure Operation and Maintenance Plan, Section 6 (de-maximus inc., September 1995). This testing must be performed once every five years, with performance testing previously occurring in 1995, 1999, 2004, and 2009. The current performance testing described in this letter report occurred December 2014.

Landfill gas generation at the L&RR Landfill has declined since the flare's initial installation. The gas system is correspondingly managed to address the gas generation rate reduction and the lower methane (CH_4) content of the collected gas. To maintain a stable flare operation it is typical to have eight to 12 of the 18 gas wells open for extraction of decomposition gas from the wastes. The gas generation and the system's operation were detailed in an August 14, 2014 letter to USEPA. In October 2014 a timer controlled on-off operation cycle of the flare was established to attain sustainable gas flow and equilibrium operation as defined in the Post Closure Operations and Maintenance Plan (*when subsurface migration and landfill surface emissions are controlled, with minimal air intrusion into the refuse, methane concentrations which do not continually degrade, and insignificant potential for subsurface refuse fires*).

Prior to 2009, condensate liquid from the gas collection pipe system was injected into the stack for evaporation and destruction. This injection practice ceased more than five years ago and is no longer in use at this Site. Therefore, the system condensate has no influence on flare emissions and condensate testing is not included in this monitoring program.

Testing Program and Results

A Pretest Protocol, dated November 12, 2014, was developed by the emissions testing contractor, CEM Services, and submitted by the Group to the USEPA for review. Following a question and response period, the Pretest Protocol was accepted by USEPA.

The performance tests were conducted December 2 and 3, 2014 in accordance with the approved protocol. The testing and results appear in the enclosed CEM Services Landfill Resource and Recovery Superfund Site Enclosed Ground Flare Five Year Compliance Test Program, December 2014, (Testing Report). The Testing Report presents the testing methods, equipment, test results, and the quality control procedures.

Destruction Efficiencies

Destruction efficiency (DE) is the percent change in pollutant mass flow rate, which is expressed by load in pounds per hour (lb/hr), between the flare inlet prior to combustion and the stack outlet after combustion. There is no mandated DE requirement for this Site; the calculation of DE is simply informative. The flare's DE is calculated in two ways.

- The first method is to calculate a DE for each test that includes a sample result from the inlet and the outlet.
- The second method is to calculate an overall DE from the average of the individual test efficiencies.

Volatile organic compounds (VOCs) were sampled in three separate runs using the TO-15/Method 18 tests on the flare inlet and outlet. Table 1 presents the DE for individual VOCs detected in these samples; VOC's below detection limits at the inlet do not appear on Table 1. The parameter concentrations were converted to lb/hr and the concentration-based and load-based DEs were computed for each detected VOC. In instances where the VOC was detected at the inlet but reported non-detected on the outlet, the DE was computed using the detection limit.

Similarly, the Total Gaseous Non-Methane Organics (TGNMO) were sampled using test Method 25 for three separate runs on the flare inlet and outlet streams. Test Method 25 measures TGNMO concentrations by oxidizing the TGNMO portion of the gas stream to carbon dioxide (CO_2), reducing the CO_2 to CH_4, and measuring CH_4 using a flame ionization detector on an "as carbon" basis. The Method 25 DE can be calculated using the measured inlet and outlet TGNMO concentrations or based on calculated inlet and outlet mass flow rates. DE calculations for the TGNMO appear in the Test Report, Appendix C. The calculated DE's for TGNMO based on measured concentrations are 91.4%, 93.5%, and 82.2% for Run 1, Run 2, and Run 3, respectively. The calculated DE's for TGNMO based on calculated mass flow rates are -1.7%, 19.0% and -102.1% for Run 1, Run 2, and Run 3, respectively.

The negative DE values based on mass emission exemplify issues that exist with the Method 25 measure of TGNMO. The method is sensitive to water moisture and CO_2, both of which are present in this landfill's gas. The method also expresses result in concentration that is converted on a CH_4 basis. Applying a VOC-to-carbon weight ratio for the mixture of compounds in the sample stream, if that ratio were known, would produce a more accurate mass concentration. Any error in the mass concentration is then amplified in the DE calculation by the large flow rate difference between inlet and outlet.

Compliance with RIDEM Air Pollution Control Regulation No. 22 (APCR 22) Standards

The primary basis for demonstrating flare emission compliance is APCR 22 AALs. The AAL standards for nine target compounds identified in the Post Closure Operation and Maintenance Plan are referenced to an earlier version of the APCR 22. In the time since this Plan was developed, APCR 22 has expanded considerably with regard to the number of pollutants that are considered air toxics. Therefore, to ensure the public is adequately protected, all air toxics detected during the December 2014 stack test were compared to the AALs in the current version of APCR 22, dated October 9, 2008. In conducting this comparison, the following steps were followed:

1. Compare stack emissions to AALs/adjusted AALs. If stack emission are below the AALs, it is assumed that emissions at the property line would also be below the AALs and no additional analysis is necessary. This data is presented in Tables 2 and 3 as follows:

   - Table 2 presents the one-hour emission rates for each air toxic detected during the December 2014 stack test, averages the data, and converts the hourly measure to 24-hour and annual emission rates determined using the scaling factors in the Rhode Island Air Dispersion Modeling Guidelines for Stationary Sources, or the Rhode Island Department of Environmental Management (RIDEM) Modeling Guidelines.
   - Table 3 compares the one-hour, 24-hour, and annual emission rates to the APCR 22 AALs, which are based on continuous exposure (8,760 hours/year). Furthermore, an adjusted AAL which accounts for limited exposure (2,080 hours/year) was determined and used for comparison to stack emission. Per Section 5.9 of the RIDEM Modeling Guidelines, adjusted AALs may be used with RIDEM approval, if public exposure to the Site is limited.

   Step 1 (Tables 2 and 3) show that stack emissions for 11 constituents exceed the adjusted AALs. Additional analysis is required for these 11 constituents (see Step 2, below). However, all other constituents are considered to meet the AALs at the stack and do not require further analysis for impact at the property line distant from the stack.

2. Predict impacts for constituents with stack emissions above the adjusted AALs. Predicted impacts, in micrograms per cubic meter ($\mu g/m^3$) were determined for the 11 constituents that had stack emissions above the adjusted AAL. To determine the predicted impacts, the unit impact ($\mu g/m^3$ per g/s) determined during the 2005 screen modeling was applied to the g/s emission rate for each applicable constituent. Table 4 presents the g/s emission rates and compares the predicted one-hour, 24-hour, and annual impacts to the respective AALs.

   Step 2 (Table 4) demonstrates that the predicted impacts for the 11 constituents identified in Step 1 meet the AALs and do not require further analysis.

Summary

A comprehensive Flare Performance Monitoring program was conducted in December 2014. The program and results appear in the Test Report by CEM Services. The data from the testing program was used to compute destruction efficiencies for the flare and to demonstrate that the APCR 22 AALs will be met. Based on our analysis, air emissions from the flare at the L&RR Site meet applicable air pollution control requirements and the current system is deemed adequately protective of the public.

Please let me know if you have any questions or need any additional information. We look forward to your response and concurrence regarding the recommendations in this letter.

Sincerely,

WOODARD & CURRAN

Alan Benevides, P.E.
Senior Vice President

Attachments: Testing Report, CEM Services
Table 1 – Destruction Efficiencies
Table 2 – Emission Rates, lb/hr
Table 3 – Emission Rates, µg/m^3 vs. Acceptable Ambient Levels
Table 4 – Predicted Impact with 2005 Modeling

cc: Paul Kulpa, RIDEM
David Moreira, Waste Management
Roy Giarrusso, Giarrusso Norton Cooley & McGlone, PC
Angela Knight, Corning Incorporated

LANDFILL RESOURCE AND RECOVERY SUPERFUND SITE
ENCLOSED GROUND FLARE
FIVE YEAR COMPLIANCE TEST PROGRAM

DECEMBER, 2014

Source Designation:
Landfill Resource and Recovery Superfund Site
Enclosed Flare
North Smithfield, Rhode Island

Operated by:
Woodard & Curran
41 Hutchins Drive
Portland, Maine 04102

Concerning:
Five Year Emission Compliance Testing on Flare

Prepared for:
Woodard & Curran
41 Hutchins Drive
Portland, Maine 04102

Prepared by:
CEMServices Incorporated
360 Old Colony Road, Suite 1
Norton, MA 02766

The information contained in this report is true and accurate to the best of my knowledge.

Digitally signed by Sean Mackay
DN: cn=Sean Mackay, o, ou=CEMServices, Inc, email=smackay@cemservices.com, c=US
Date: 2015.03.18 12:10:30 -04'00'

Sean MacKay
Technical Director, QSTI

3/18/2015
Date

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1. INTRODUCTION

Woodard & Curran operates the combined landfill gas collection and treatment facility for the Landfill and Resource Recovery (L&RR) Superfund site in North Smithfield, Rhode Island. The site utilizes an enclosed ground flare for destruction of volatile organic compounds (VOC's) and other air toxics. As part of the operation and maintenance for the facility, compliance with Rhode Island Air Toxics (RIAT) Regulation No. 22 for Acceptable Ambient Levels (AAL) must be demonstrated every five years. Woodard & Curran has retained CEMServices of Norton, Massachusetts to conduct the compliance program for the 2014 schedule (flare was last tested during the week of December 1, 2009).

The purpose of this test program is to demonstrate that the enclosed flare continues to meet the emission limits outlined in Section 6 of the Post-Closure Operation and Maintenance Plan for the L&RR sited dated September, 1996. As per this plan, testing was performed at the inlet and outlet of the flare to demonstrate destruction efficiency of VOC's, specifically total non-methane organic compounds (TNMOC), as well at outlet testing to quantify emissions of NOx, CO, SO2, HCL, PCDD, PCDF, PCB's and other VOC air toxics (per TO-15). Table 1-1 below indicates the air contaminants tested, the test methodologies, and the test run lengths used during the emissions test program. Three runs were performed for all parameters. All test data was reported in units of each applicable emission limit and all testing was conducted in strict accordance with these methods.

TABLE 1-1 COMPLIANCE PROGRAM OVERVIEW

Constituents/Locations	Test Methods	Test Run Length
Volumetric Flow / (Inlet and Outlet)	EPA Test Methods 1-2	60-180 Minutes
Oxygen (O_2)/Carbon Dioxde (CO_2) / (Outlet)	EPA Test Method 3A	60 Minutes
Moisture / (Inlet and Outlet)	EPA Test Method 4	60-180 Minutes
Sulfur Dioxide (SO2) / (Outlet)	EPA Test Method 6C	60 Minutes
Nitrogen Oxides (NOx) / (Outlet)	EPA Test Method 7E	60 Minutes
Carbon Monoxide (CO) / (Outlet)	EPA Test Method 10	60 Minutes
PCDD, PCDF and PCB's / (Outlet) (Total 2,3,7,8, TCDD Equivalents)	EPA Test Method 23	180 Minutes
Total Non-Methane Organic Compounds (TNMOC) / (Inlet and Outlet)	EPA Test Method 25	60 Minutes
Hydrogen Chloride (HCL) / (Outlet)	EPA Test Method 26A	60 Minutes
Volatile Organic Compounds (VOC's) (Inlet and Outlet)	TO-15 (EPA Method 18)	60-120 Minutes

The data from testing was used to compute emission rates. Table 1-2 below indicates the air contaminants, units of measure, and procedure to calculate emission rates.

TABLE 1-2 POLLUTANTS AND EMISSION LIMITS

Constituents	Emission Rate Units	Procedure
Volumetric Flow Rate of stack	dry cubic feet per minute	EPA Method 1-2
SO2, NOx, CO,	pounds per hour	Flow rate and average of 3 runs
PCDD, PCDF and PCB's	pounds per hour	Flow rate and average of 3 runs, compare to RI APCR 22 AALs
HCL	pounds per hour	Average of 3 runs, compare to RI APCR 22 AALs
TNMOC	ug/m^3	Average of 3 runs
Target VOCs	ug/m^3	Average of 3 runs, compare to RI APCR 22 AALs where applicable

Sean MacKay of CEMServices was the Project Director for this test program. He was assisted in the field by Jim Jardin, Chris Parrot, and Matt Coulombe also of CEMServices. Woodard & Curran personnel were responsible for process operation and recording all relevant process parameters during all compliance testing.

CEMServices used Maxxam Analytical for the analysis of HCL, PCDD/PCDF, PCB and TO-15 samples collected during this test program. Triangle Laboratory Services was used for the analysis of TNMOC (Method 25). The program took place during the week of December 1st, 2014. Contact information is presented below.

TABLE 1-3 PROJECT CONTACT INFORMATION

COMPANY	PURPOSE	CONTACT
Woodard & Curran	O&M	Paul Porada, PE (207) 774-2112 x3242
CEMServices	Stack Testing	Sean MacKay, QSTI (508) 958-4387

2. SUMMARY OF RESULTS

TABLE 2-1 – TEST MATRIX TIMELINE

DATE	TIME	TEST
12/2/2014	11:13-14:25	PCDD/PCDF/PCB - 1
12/2/2014	15:08-1814	PCDD/PCDF/PCB - 2
12/3/2014	09:00-12:15	PCDD/PCDF/PCB - 3
12/2/2014	12:13-13:27	HCL - 1
12/2/2014	16:08-17:04	HCL - 2
12/3/2014	12:45-13:48	HCL - 3
12/2/2014	10:55-11:55	TGNMOC - 1
12/2/2014	13:05-14:05	TGNMOC - 2
12/2/2014	15:30-16:30	TGNMOC - 3
12/3/2014	09:00-10:40	TO-15 (VOC) - 1
12/3/2014	10:45-12:20	TO-15 (VOC) - 2
12/3/2014	12:25-14:35	TO-15 (VOC) - 3
12/3/2014	09:00-10:00	NOx, CO, SO2 - 1
12/3/2014	10:15-11:15	NOx, CO, SO2 - 2
12/3/2014	11:25-12:25	NOx, CO, SO2 - 3

TABLE 2-2 – HCL SUMMARY OF RESULTS

Constituents	Units	Run 1	Run 2	Run 3	Average
Date		12/2/14	12/2/14	12/3/14	
Time		1213-1327	1608-1704	1250-1400	
O2	%	16.16	16.17	16.29	16.21
Moisture	%	4.4	5.3	5.0	4.9
Stack Temperature	Deg. F	853	890	886	876
HCL	PPM	0.50	0.48	0.60	0.53
	LB/HR	0.02	0.01	0.02	0.02

TABLE 2-3 – NOx, CO, SO2 SUMMARY OF RESULTS

Constituents	Units	Run 1	Run 2	Run 3	Average
Date		12/3/14	12/3/14	12/3/14	
Time		0900-1000	1015-1115	1125-1225	
O2	%	16.25	16.25	16.28	16.26
Moisture	%	4.8	4.8	4.8	4.8
Stack Temperature	Deg. F	899	899	899	899
NOx	PPM	2.38	2.42	2.29	2.36
	LB/HR	0.09	0.09	0.09	0.09
CO	PPM	875.80	865.20	866.60	869.2
	LB/HR	20.54	20.29	20.33	20.39
SO2	PPM	0.00	0.00	0.15	0.05
	LB/HR	0.00	0.00	0.01	0.00

2. SUMMARY OF RESULTS (Continued)

TABLE 2-4 – PCDD/PCDF/PCB SUMMARY OF RESULTS

Constituents	Units	Run 1	Run 2	Run 3	Average
Date		12/2/14	12/2/14	12/3/14	
Time		1113-1425	1508-1814	0900-1215	
O2	%	16.16	16.17	16.26	16.20
Moisture	%	3.9	3.8	4.8	4.2
Stack Temperature	Deg. F	848	903	899	883
TOTAL PCDD/PCDF	NG	0.291	0.068	2.313	0.891
	NG/DSCM	0.105	0.024	0.755	0.295
	NG/DSCM@7%O2	0.309	0.073	2.261	0.881
	LB/HR	2.22E-9	5.13E-10	1.51E-8	5.94E-9
TOTAL PCDD/PCDF *(toxicity)	NG	0.011	0.011	0.028	0.017
	NG/DSCM	0.004	0.004	0.009	0.007
	NG/DSCM@7%O2	0.011	0.011	0.028	0.017
	LB/HR	8.02E-11	2.27E-14	1.86E-10	8.87E-11
PCB	NG	167.248	132.482	1741.560	680.430
	NG/DSCM	60.553	47.293	568.221	225.356
	NG/DSCM@7%O2	177.570	138.98	1702.214	672.921

*(toxicity) – is the sum of total toxic equivalency (teq) values for the cogeners tested. These teq's are based on the 2005 World Health Organization (WHO), Human and Mammalian toxic equivalency factors for dioxins and dioxin like compounds.

TABLE 2-5 – TGNMOC SUMMARY OF RESULTS

Location	Units	Run 1	Run 2	Run 3	Average
Date		12/2/14	12/2/14	12/2/14	
Time		1055-1155	1305-1405	1530-1630	
Inlet	PPM	1195	1328	1314	1279
Oultet	PPM	100	86	234	140
	Destruction Eff. %	91.6	93.5	82.2	89.1
Inlet	MG/M3	597	663	656	639
Oultet	MG/M3	50	43	117	70
	Destruction Eff. %	91.6	93.5	82.2	89.1
Inlet	LB/HR	1.38	1.49	1.63	1.50
Oultet	LB/HR	1.41	1.21	3.30	1.97

2. SUMMARY OF RESULTS (Continued)

TABLE 2-6 – TO-15 VOC SUMMARY OF RESULTS

COMPOUND	Units	INLET RUN 1	OUTLET RUN 1	INLET RUN 2	OUTLET RUN 2	INLET RUN 3	OUTLET RUN 3	INLET AVG	OUTLET AVG
Dichlorodifluoromethane (FREON 12)	ug/m3	593	17.8	595	18.8	683	17	624	18
1,2-Dichlorotetrafluoroethane	ug/m3	846	22.0	850	22.9	975	24.2	890	23
Chloromethane	ug/m3	129	15.7	ND	12.7	ND	8.52	ND	12
Vinyl Chloride	ug/m3	2240	45.1	2280	51.3	2730	60.7	2417	52
Chloroethane	ug/m3	314	14.2	295	15	351	1.2	320	10
1,3-Butadiene	ug/m3	ND	52.8	ND	44.7	ND	38.8	ND	45
Acetone (2-Propanone)	ug/m3	16000	6493	12000	817	12667	103	13556	2471
Methyl Ethyl Ketone (2-Butanone)	ug/m3	12667	167	ND	ND	ND	ND	ND	ND
cis-1,2-Dichloroethylene	ug/m3	2190	35.4	2120	39	2670	52.8	2327	42
Chloroform	ug/m3	ND	17.3	ND	19.2	ND	ND	ND	ND
1,1-Dichloroethane	ug/m3	717	14.6	772	54	933	0.809	807	23
Trichloroethylene	ug/m3	374	29	422	30.6	476	10.9	424	24
Tetrachloroethylene	ug/m3	632	24.4	622	25.8	748	20.1	667	23
Benzene	ug/m3	7840	329	7450	361	8940	523	8077	404
Toluene	ug/m3	136200	5900	105267	5360	136000	2124	125822	4461
Ethylbenzene	ug/m3	34767	380	33593	257	42500	388	36953	342
p+m-Xylene	ug/m3	60233	466	58433	466	73833	398	64166	443
o-Xylene	ug/m3	14900	114	14900	284	18177	101	15992	166
Styrene	ug/m3	441	22.2	405	17.3	514	36.6	453	25
4-ethyltoluene	ug/m3	ND	ND	1980	205	2540	10.8	ND	ND
1,3,5-Trimethylbenzene	ug/m3	2580	44.2	2530	46.7	3200	5.53	2770	32
1,2,4-Trimethylbenzene	ug/m3	4910	44.2	4820	46.7	6260	3.42	5330	31
Chlorobenzene	ug/m3	1210	24.5	1220	27.8	1590	46.9	1340	33
1,4-Dichlorobenzene	ug/m3	1080	43.3	1060	45.7	1430	63.4	1190	51
Hexane	ug/m3	8830	188	7140	233	9180	116	8383	179
Heptane	ug/m3	4980	59.3	4680	60.9	5710	77.4	5123	66
Cyclohexane	ug/m3	3610	49.6	3410	46.4	4150	51.3	3723	49
Total Xylenes	ug/m3	72300	580	70800	360	89600	485	77567	475
Propene	ug/m3	8160	749	7760	759	9300	1110	8407	873
2,2,4-Trimethylpentane	ug/m3	490	16.8	366	17.8	480	6.89	445	14

Note – A complete list of all TO-15 VOC results is presented in Appendix E. The compounds shown above were the ones that were above the detection limit. The TO-15 train consisted of a mini impinger with 20 ml of water before the canister to knock out any moisture. The values in the above table are the addition of the concentrations found in air and water (if above detection limit).

3. FACILITY DESCRIPTION

3.1 Process Description

Woodard & Curran operates the combined landfill gas collection and treatment facility for the Landfill and Resource Recovery (L&RR) Superfund site in North Smithfield, Rhode Island. The site utilizes an enclosed ground flare for destruction of volatile organic compounds (VOC's) and other air toxics. The operating temperature is in the range of 1500^{o}F – 1,700^{o}F.

The treatment process consists of two, three-stage centrifugal blowers equipped with a 20-horsepower motors (3,525 revolutions per minute), conveying the Landfill Gas (LFG) into an enclosed ground flare (John Zinc Co., Model ZTOF). The flare is six feet in diameter and forty feet tall. The flare is configured with automatic combustion dampers, a stack thermocouple, and ultraviolet flame scanner, and a flame failure detection and automatic shutdown control, and includes a flame arrestor in the inlet supply line. An automatic purge and ignition system includes a propane pilot assembly and an electronic ignition. The propane pilot system shuts off after combustion is supported by the LFG. The flare is designed to provide a maximum firing rate of 28.7 MMBtu/hr at an LFG input rate of 1,050 CFM.

The flow and energy content of the L&RR Landfill gas has been in decline. A decline in gas is expected following closure of a landfill. The monthly monitoring conducted in 2014 finds methane content of landfill gas supplied to the flare typically in the 25% to 35% by volume range, and flow rate of 380 CFM to 450 CFM. As of November 2014 the combustion flare is operating on a timer controlled on-off cycle to address the gas generation decline.

3.2 Sample Locations

The inlet sample location is a circular pipe with an inside diameter of approximately 8 inches. The flow sampling ports are located approximately 30 inches downstream (3.8 duct diameters) and 54 inches upstream (6.8 duct diameters) of the nearest flow disturbance. The pollutant sample port is located 16 inches (2.0 duct diameters) upstream from the flow port. Inlet pollutant sampling was performed at a centrally located point in the duct.

The outlet sample location is located on a test platform about 40 feet above ground level. The inside stack diameter at the sampling port location is 67.5 inches. 4 test ports are located on a horizontal plane 90 degrees apart from each other. The ports are 452 inches downstream (6.7 diameters) and 35 inches upstream (0.5 duct diameters) from flow disturbances.

3. FACILITY DESCRIPTION (continued)

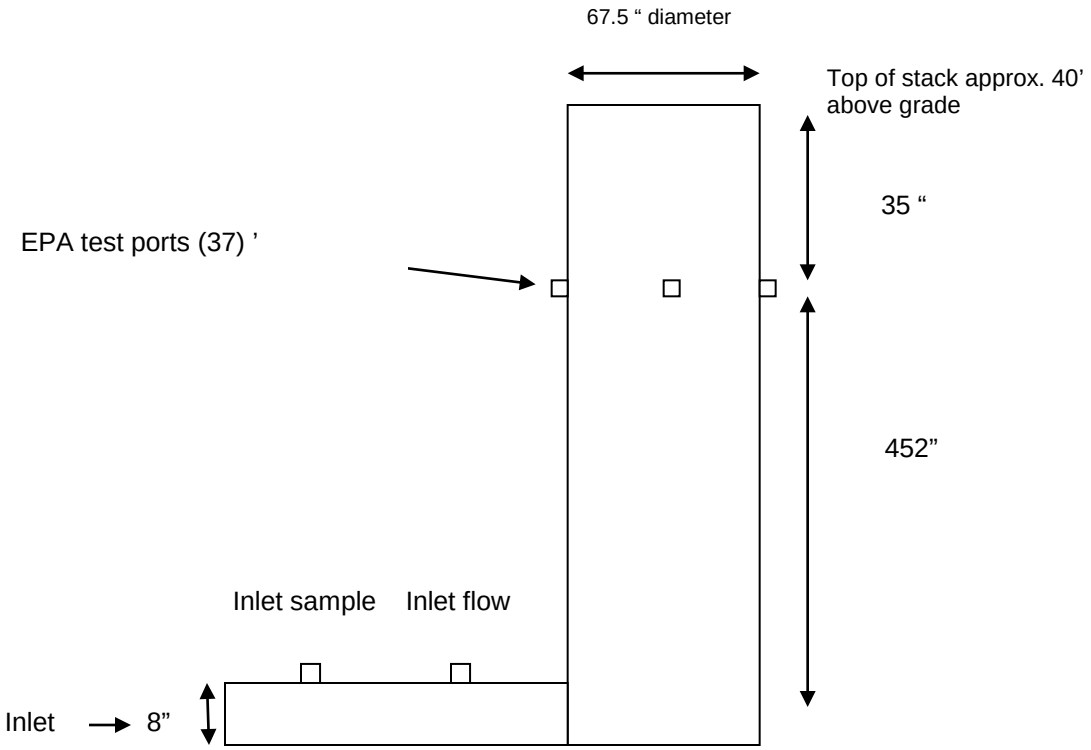


Figure 3-1
L&RR LFG Flare
Sample Port Locations
Inlet and Outlet

Figure not drawn to scale

Stack Height Above Grade - 40 feet
Stack Inside Diameter at Test Port – 5.625 feet (67.5 inches)

Outlet Disturbance Distances
1. Above Grade 40 feet
2. Above Last Disturbance (duct change to test ports, aka distance downstream)
   A. Feet – 37.7 feet (452 inches)
   B. Stack Diameters – 6.7
3. Prior to Stack Exit (test ports to stack exit, aka distance upstream)
   A. Feet – 2.9 feet (35 inches)
   B. Stack Diameters – 0.5

Inlet Disturbance Distances
1. Above Last Disturbance (duct change to test ports, aka distance downstream)
   A. Feet - 2.5 (30 inches)
   B. Stack Diameters – 3.8
3. Prior to Stack Entrance (test ports to stack entrance, aka distance upstream)
   A. Feet – 4.5 feet (54 inches)
   B. Stack Diameters – 6.8

4. REFERENCE METHOD TEST PROCEDURES

4.1 Velocity Traverse - EPA Reference Method 1

EPA Reference Method 1 procedures delineate velocity traverses for stationary sources. As based upon EPA Method 1 criteria, a total of sixteen (16) traverse points, eight (8) points using two (2) available test ports, were used for all traverses and volumetric flow rate determinations at the inlet and outlet sample locations.

The probes were marked according to the measurements in Tables 4-1 and 4-2.

TABLE 4-1 TRAVERSE POINT LOCATIONS – FLARE OUTLET

Traverse Point	Distance (% Diameter)	Distance from Wall (inches)
1	3.2	1.9
2	10.5	6.3
3	19.4	11.6
4	32.3	19.4
5	67.7	40.6
6	80.6	48.4
7	89.5	53.7
8	96.8	58.1

TABLE 4-2 TRAVERSE POINT LOCATIONS – FLARE INLET

Traverse Point	Distance (% Diameter)	Distance from Wall (inches)
1	3.2	0.5
2	10.5	0.8
3	19.4	1.6
4	32.3	2.6
5	67.7	5.4
6	80.6	6.4
7	89.5	7.2
8	96.8	7.7

The pitots were connected to a manometer using 1/8 inch ID Tygon tubing. These connections are checked for leaks before they are initially used and at the conclusion of each run. The inlet location also contains a thermal mass meter for measuring volumetric flow. This meter was used for inlet flow determinations.

4. REFERENCE METHOD TEST PROCEDURES (continued)

4.2 Volumetric Flow Rate - EPA Reference Method 2

EPA Reference Method 2 was used for the determination of stack gas velocity and volumetric flow rate. Before the velocity traverse is started, a leak check was conducted on the pitots, and the manometer was leveled. The velocity head and stack gas temperature were recorded for each of the required sampling points. Simultaneous gas density (Reference Method 3A) and stack gas moisture content (Reference Method 4) testing were conducted during every test run. Each test run's length corresponded with the concurrent testing. All pitots used in this program were visually inspected and assigned a pitot coefficient of 0.84

4.3 Nitrogen Oxides (NOx) and CEMS Calibration Procedures - EPA Reference Method 7E

EPA Reference Method 7E is used for the determination of Nitrogen Oxides emissions from stationary sources using instrumental analyzer procedures. In addition, all calibration procedures and requirements for the other instrumentation methods used, EPA Reference Methods 3A, 6C, and 10 are specified in this method.

Before any testing is conducted, the calibration span of all test analyzers was set up so that expected source emissions were at least twenty (20) percent of this span and would not exceed this span. Once this span is determined, calibration gases were chosen within this span. Only gases prepared according to EPA Protocol G1/G2 were used. Certificates of analysis for all gases were provided on-site at the time of testing. Analyzer calibration error checks were then conducted by challenging each analyzer with a zero, mid, and high gas. The actual value of the high gas used was the calibration span of each analyzer. Analyzer responses to these gases were within two (2) percent of the instrument's span or within 0.5 PPM of the gas value. Before and after each test run a sampling system bias check was conducted on each monitor.

This check consisted of introducing the calibration gases at the sampling probe thus allowing the gases to travel through the entire sampling system including any filters. The analyzer responses to this check were then recorded by the data acquisition system. All system bias check responses were within five (5) percent of the instruments span or within 0.5 PPM, when compared to the analyzer calibration error check conducted initially. The sampling system bias check conducted prior to each test run was compared to the sampling system bias check conducted at the completion of that same run.

Differences between the two bias checks constitute the upscale and zero calibration drifts. All calculated calibration drifts were below three (3) percent of the span of the analyzer or within 0.5 PPM. Once the initial system bias check was conducted the system was put into the sample mode and data acquisition was initiated. The probe was positioned at the first of the required traverse points determined by the stratification check.

To ensure that the NH_3 in the stack gas (if applicable) was not converted to NO, CEMServices utilized a Model 300 Molybdenum converter. The Molybdenum converter is used to convert NOx to NO at a lower temperature (approx. 350 ^{O}C) specific to NOx, thus eliminating the conversion of NH_3.

A Thermo Environmental Model 42 NOx/NO_2/NO analyzer was used to continuously measure the concentration of NOx in the effluent gas. The analytical technique of the analyzer is chemiluminescence. In the determination of NOx, the sample is routed through a molybdenum converter where the NO_2 is disassociated to form NO. The sample is then passed through a reaction chamber where the NO is quantitatively converted to NO_2 by

4. REFERENCE METHOD TEST PROCEDURES (continued)

gas phase oxidation with molecular ozone produced within the analyzer. In this reaction, the NO_2 molecules are elevated to an electronically excited state, and then immediately reverted to a non-excited ground state. This reversion is accompanied by the emission of photons, which impinge on a photomultiplier detector and generate a low level DC current. The current is then amplified and used to drive a front panel LED display and data recorder. The NOx concentration measured by the instrument includes the contributions of both the NO in the effluent and the NO resulting from the dissociation of NO_2. The efficiency of this converter was checked prior to testing using the procedure specified in Section 8.2.4.1 of this Method.

A STRATA data shuttle documented voltage output from each monitor. This instrument sends all signals via a RS-232 cable to a computer for data archiving. Data points were logged every two (2) seconds during each test run. At the test run completion, data was transferred to a spreadsheet for determination of the raw run average. This data is included in this final report. Results from the initial and final system bias checks were used to adjust the raw run average to correct it for any deviations due to the system bias.

Before any reference method CEM test data is taken, a CEM stratification check was conducted to ensure that there is no stratification at the stack test location. Stratification is defined as a difference between the average concentration of the stack and the concentration at any other point. To quantify the stratification, CEMServices conducted a CEM traverse using the 12 points used in the flow traverse as specified in Method 1. Each point was sampled for twice the response time of the system. The facility load was used as a reference point to ensure process changes haven't occurred during the time needed to conduct the traverse.

4.4 Oxygen (O_2) and Carbon Dioxide (CO_2) - EPA Reference Method 3A

EPA Reference Method 3A is used for the determination of Oxygen and Carbon Dioxide emissions from stationary sources using instrumental analyzer procedures. All calibration procedures and requirements for this instrumentation method are identical to those found in EPA Reference Method 7E. O_2 content in the effluent was determined by a California Analytical Model 100 monitor, which utilizes a micro-fuel cell that consumes O_2 from the atmosphere surrounding the measurement probe. The consumption of O_2 generates a proportional electrical current. This current is then amplified and provides a signal output of 0-1 V DC, which corresponds to a full-scale range of 0-25 % O_2. A California Analytical Model 100 non-dispersive infrared analyzer is used to continuously measure the CO_2 concentration in the effluent. The theory of operation for this analyzer is based on the principle that CO_2 has a unique absorption line spectrum in the infrared region. The instrument consists of an infrared light source, a chopper, a measurement cell, and a detector. The infrared light beam emitted by the source passes through the measuring cell, which is filled with a continuously flowing gas sample. The light beam is partially absorbed or attenuated by the gas species of interest in this cell before reaching the front chamber of the detector. Both the front and rear chambers of the sealed detector are filled with a reference gas. The difference in the amount of light absorbed between the front and rear chambers are dependent of the concentration of the gas species of interest within the sample measurement cell. A pressure differential is thus created between the two chambers. This pressure difference is then observed as gas flow by the micro-flow sensor located in a channel connecting the two chambers. The resulting AC signal from the micro-flow sensor is rectified, amplified, and linearized into a DC voltage signal for output.

4. REFERENCE METHOD TEST PROCEDURES (continued)

4.5 Sulfur Dioxide (SO_2) - EPA Reference Method 6C

EPA Reference Method 6C is used for the determination of sulfur dioxide emissions from stationary sources using instrumental analyzer procedures. All calibration procedures and requirements for this instrumentation method are identical to those found in EPA Reference Method 7E. A Western Research Series 921 was used during this test program. The 921 is a UV based dual beam dual wavelength analyzer.

4.6 Carbon Monoxide (CO) - EPA Reference Method 10

EPA Reference Method 10 is used for the determination of Carbon Monoxide emissions from stationary sources using instrumental analyzer procedures. All calibration procedures and requirements for this instrumentation method are identical to those found in EPA Reference Method 7E. A Thermo Environmental Model 48 Gas Filter Correlation (GFC) analyzer is used to continuously sample the CO concentrations in the gas stream. GFC spectroscopy is based on the comparison of the infrared (IR) absorption spectrum of the measured gas to that of other gases in the sample being analyzed. This technique is implemented by using a high concentration sample of the measured gas (i.e. CO) as a filter for the infrared radiation transmitted through the analyzer.

Radiation from an IR source is chopped and passed through a gas filter alternating between CO and N_2 due to rotation of the filter wheel. The radiation then passes through an interference filter and on to an absorption cell.

The IR radiation exits the sample cell and falls on to an IR detector. The CO gas filter produces a reference beam which cannot be further attenuated by CO in the sample cell. The N_2 side of the filter wheel is transparent to the IR radiation and thus produces a measure beam which is partially absorbed by CO in the cell. The chopped detector signal is modulated by the alternation between the two gas filters with is amplified and related to the concentration of CO in the sample cell. Other gases, which absorb the reference and measure beams equally, do not cause modulation of the detector signal leaving the GFC responding specifically to CO. An interference response check was conducted on the CO analyzer prior to testing.

4.7 Moisture Content - EPA Reference Method 4

EPA Reference Method 4 is used for the determination of moisture content in stack gas. This method consists of extracting a known volume of gas sample and quantifying the removed moisture portion of this sample. Moisture content was determined from each corresponding test run.

Before each test run the impingers used to remove condensate from the gas were prepared according to each specific method. Impingers were loaded according to each method. The sampling train was then assembled and the sampling probe heated. The train was checked for leaks by plugging the sample inlet and challenging the train with a vacuum of 15 inches of Hg. All leak rates were below 0.02 CFM. The initial meter volume was recorded and the probe was positioned at the first traverse point. Sampling was conducted isokinetically for each run when required. At the completion of each test run the final meter volume was recorded and another leak check was conducted. The impingers were recovered and their final volumes recorded.

4. REFERENCE METHOD TEST PROCEDURES (continued)

4.8 Hydrogen Chloride - EPA Reference Method 26A

EPA Reference Method 26A was used for the determination of HCL. Sampling of the flare outlet consisted of three (3), one (1) hour test runs. Before each test run, the impingers used to remove condensate from the gas were prepared. A total of four impingers were loaded according to the method (modified Greenburg Smith, Greenburg Smith, modified Greenburg Smith, and modified Greenburg Smith). The first two impingers were each loaded with 100 ml of 0.1 N sulfuric acid solution. Inserting a desiccated tared filter into the glass filter holder assembled the remainder of the sample train. The filter holder is then placed into the hotbox and the sample probe and nozzle are attached. The hotbox and sample probe were heated to approximately 248 ^{O}F. Prior the start of each run a leak check was performed from the end of the nozzle at a vacuum of 15 inches of mercury.

The run was then initiated and isokinetic sampling took place. The entire stack was traversed according to the sample points specified in Method 1. 3.75 minute readings were taken during the one hour test run. At the conclusion of the test a post leak check was conducted at the highest vacuum obtained during the run and the sample train was moved to the cleanup site where it was recovered in strict accordance with EPA Reference 26A sample recovery procedures as follows:

Container #1. The filter was carefully removed from the filter holder and placed in it's identified petri dish container.

Container #2. Taking care to see that dust on the outside of the probe or other exterior surfaces did not get into the sample, particulate matter from the nozzle, probe liner and front half of the filter holder were quantitatively recovered by washing these components with acetone into a glass or Nalgene container. The inside of each component was brushed and rinsed until the acetone rinse showed no visible particles, after which a final rinse of the inside surface was performed.

Container #3 (impinger contents for Hydrogen Chloride (HCl): The solution in the impingers were measured using a clean graduated cylinder and the volumes recorded. Each impinger and all connecting glassware were rinsed twice with DIUF and all contents were transferred to a clean sample bottle.

Sample analysis was performed by ion chromatography by Maxxam Analytical.

4.9 Dioxins / Furans /PCB's – EPA Reference Method 23

Dioxin and Furan and PCB emissions were determined in strict accordance with EPA Reference Method 23. The stack sample is withdrawn isokinetically from the source. The test series consisted of three (3) – three (3) hour test runs. The sample train is a modified EPA Reference Method 5 train with the addition of a coiled glass condenser and a spiked trap. The particulate emissions of the sample were collected in the nozzle, probe, and heated filter. The gaseous emissions were collected in the condenser, XAD-2 resin trap, and prepared impingers. The XAD traps used for Method 23 were spiked with PCB surrogates prior to sampling. A field blank was taken onsite and analyzed with the run samples.

Prior to mobilization, all sorbent traps and XAD-2 resin were pre-cleaned in accordance with the method at Maxxam. Traps were packed with the XAD-2 resin and shipped just prior to mobilization into the field. The traps were kept in a cooler, on ice, from delivery to CEMServices through field-testing and return to the laboratory.

4. REFERENCE METHOD TEST PROCEDURES (continued)

Prior to mobilization, all glassware and Teflon train components were rinsed three times with HPLC grade acetone, HPLC grade methylene chloride, and HPLC grade toluene, and allowed to dry. All prepared components were sealed with hexane-rinsed aluminum foil. All quartz glass fiber filters were rinsed with HPLC grade hexane, allowed to dry on hexane rinsed foil, and stored in a hexane-rinsed petri dish and wrapped in rinsed foil. All recovery tools, including Teflon-coated spatulas and forceps, Teflon dispenser bottles and Teflon recovery materials were also hexane-rinsed. Cotton gloves were worn during all preparation and recovery procedures.

All EPA Reference Method 23 testing was conducted using a modified particulate, flow and moisture sampling train. A glass probes liner, nozzle, and Teflon fittings were used. According to the reference method, the impingers were loaded as follows: Impinger 1 was empty, Impingers 2 and 3 – 100ml of DI, Impinger 4 – empty, and Impinger 5 – approximately 550 grams of silica gel.

The filter holder was then placed into the hot box and the sample probe and nozzle was attached. The hotbox and sample probe were heated to approximately 248 ^{O}F. The condenser coil was cooled by circulating water from an ice bath and the prior to the start of each run, a leak check was performed from the end of the nozzle at a vacuum of 15 inches of mercury.

The run was initiated and isokinetic sampling took place. The entire stack was traversed according to the sample points specified in EPA Reference Method 1. 11.25 minute readings were taken during the three (3) hour test run. At the conclusion of the test, a post leak check was conducted at the highest vacuum obtained during the run. All connecting glassware was sealed with hexane rinsed aluminum foil and the sample train was moved to the cleanup site where it was recovered in strict accordance with Method 23.

4.10 Volatile Organic Compounds (VOC's), Total Non-Methane Organic Compounds (TNMOC) – EPA Test Methods 25

Method 25 was used to determine the concentration of total non-methane organic compounds (TNMOC) reported as carbon at the inlet and outlet to the flare (due to the high concentration of VOC's expected). Sampling of the flare inlet and outlet consisted of three (3), one (1) hour test runs. The gaseous samples were withdrawn from the sample locations at a constant rate through a heated filter and a chilled condensate trap via an evacuated sample tank. After sampling is completed, the TNMOC is determined by analyzing the sample tank fraction and condensate trap independently then combining the analytical results. The organic content of the condensate trap fraction is determined by oxidizing the NMO to carbon dioxide and quantitatively collecting in the effluent in an evacuated vessel, and then a portion of the CO2 is reduced to CH4 and measured by an FID. The organic content of the sample tank fraction is measured by injecting a portion of the sample gas into a gas chromatographic column to separate the NMO from the carbon monoxide (CO), CO2 and CH4, the NMO are oxidized to CO2, reduced to CH4 and measured by FID.

Supplementaly, Method 25A was also used for the measurement of total gaseous organic concentrations using flame ionization detection (FID) and gas chromatography (GC), at the outlet location, however the concentrations were well over the ranges of the calibration gases so this data was for informational purposes only.

4. REFERENCE METHOD TEST PROCEDURES (continued)

4.11 Target VOC's – Method TO-15/EPA Method 18

Method TO-15 was used to measure subsets of volatile organic compounds (VOC's) that are also hazardous air pollutants (HAP's). Sampling of the flare inlet and outlet consisted of three (3), one (1) hour test runs. The following is a summary of the procedure used for sampling. The samples were drawn into a specially-prepared evacuated stainless steel canister (SUMMA). The sample is drawn through a sampling train comprised of components that regulate the rate and duration of sampling into the pre-evacuated canister. After the air sample is collected, the canister valve was closed, an identification tag was attached to the canister, and the canister was transported to Triangle Environmental Services for analysis. Upon receipt at the laboratory, the canister tag data is recorded and the canister is stored until analysis. To analyze the sample, a known volume of sample is directed from the canister through a solid multisorbent concentrator. A portion of the water vapor in the sample breaks through the concentrator during sampling, to a degree depending on the multisorbent composition, duration of sampling, and other factors. After the concentration and drying steps are completed, the VOCs are thermally desorbed, entrained in a carrier gas stream, and then focused in a small volume by trapping on a reduced temperature trap or small volume multisorbent trap. The sample is then released by thermal desorption and carried onto a gas chromatographic column for separation. At a minimum, analysis was performed for past pollutants (TO-14) including benzene, chloromethane, methelyne chloride, chloroform, toluene, and zylene. Additional VOC's (TO-15) included chlorobenzene, methyl ethyl ketone, 2-propanone, ethanol, vinyl chloride, propene and carbon disulfide.

4.12 CEM Stratification Check

Before any reference method test data is taken, a CEM stratification check was conducted to ensure that there is no stratification at the stack test location. Stratification is defined as a difference in excess of 10 percent between the average concentration of the stack and the concentration at any other point. To ensure stratification did not exist, CEMServices conducted a 12-point CEM traverse using the points used in the flow traverse as specified in Method 1. Each point was sampled for two (2) minutes. Once the traverse was completed, each point was checked to see if it is within 10 percent of the average of all the points.

TABLE 4-3 STRATIFICATION CHECK TRAVERSE POINT LOCATIONS – FLARE OUTLET

Traverse Point	Distance (% Diameter)	Distance from Wall (inches)
1	4.4	3.0
2	14.6	9.9
3	29.6	20.0
4	70.4	47.5
5	85.4	57.6
6	95.6	64.5

5. REFERENCE METHOD TEST EQUIPMENT

5.1 Mobile CEM Laboratory

EPA Reference Methods 3A, 7E, 6C, and 10 described in Section 4 were conducted using the CEMServices mobile CEM laboratory. This laboratory consists of all analyzers and support equipment used to conduct the CEM sampling during this test program. The following is a description of each item that makes up the entire system:

Sample Probe - A stainless steel probe was used for this test program. The probe has a filter at the inlet to remove particulate matter.

Particulate Filter - This in-stack filter is of a sintered stainless steel design.

Heated Sample Line - The heated sample line is two hundred (200) feet long and transports the gas sample from the CEM probe to the moisture removal system. This line is heat traced and maintained at a temperature of 250 ^{O}F.

Sample Gas Analyzers - CEMServices used the following analyzers to complete this test program:

TABLE 5-1 REFERENCE METHOD ANALYZERS

GAS	MANUFACTURER	MODEL	APPROXIMATE SPAN
O_2	California Analytical	100	0 – 22.7%
CO_2	California Analytical	100	0 – 19.85 %
SO_2	Western Research	Series 921	0-94.5 PPM
NOx	Thermo Electron	42	0-94.87 PPM
CO	Thermo Electron	48	0-1944 PPM

Data Recorder - All voltage outputs from the analyzers were sent to a Strawberry Tree Data Shuttle. This shuttle logged data at two-second intervals. Data from the shuttle was sent to a computer where a Strawberry Tree data acquisition program listed instantaneous concentration values for each parameter. At the conclusion of each run, one-minute averages are printed out and a calibration is initiated through the program. The calibration data is used to correct the raw averages for system bias and drift.

5.2 Modified EPA Reference Method 5 Sampling Trains

All modified EPA Reference Method 5 testing, described in Section 4 was conducted using several trains manufactured by Nutech. During the test program testing for different constituents were conducted simultaneously. Due to the sampling requirements of the individual test methods, each modified Reference Method 5 train was slightly different to conform to the specific method requirements. Although there were slight differences to the sample filters and impinger contents, all trains consisted of the following basic components:

Meter Boxes - The meter boxes used in this program were the Nutech Model 2010 - Isokinetic Stack Samplers. These boxes consist of a leak-free sample pump, a dry gas meter, a vacuum gauge, and a temperature readout. Thermocouples are mounted on the inlet and outlet of the dry gas meter to provide meter temperatures during testing.

5. REFERENCE METHOD TEST EQUIPTMENT (continued)

Umbilicals - The umbilicals used in this program consisted of a sample line, pitot lines, and thermocouple lines. These lines transported sample from the impingers to the meter box, indicate pressure difference at the pitots to the meter box, and carry temperature signals from the stack to the temperature readout in the meter box.

Condenser System - This system consisted of glass or Teflon impingers placed in series and in an ice bath. The number of impingers, impinger content, and impinger type varied depending on which test method was being performed.

Probe - The probe assembly consisted of a set of "S" type pitots, a stack thermocouple, and a stainless steel sheath with a heated stainless steel liner.

Particulate Filter - This in-stack filter is a Labyrinth Systems 5 micron sintered stainless steel design.

5.3 Calibration Gases

All calibration gases used in this test program were prepared according to EPA Protocol G1/G2. As per EPA Reference Method 7E for all O_2, CO_2, CO, SO_2, and NOx testing, the high level calibration gas was the span of the analyzer. All mid calibration gas values were between 40-60 % of the span of the analyzer (or value of the high level gas), and all low calibration gas values were between 0-20 % of the span of the analyzer (or value of the high level gas). The zero calibrations for all analyzers were conducted using UHP grade Nitrogen (N_2). As per Method 25A for VOC testing all low range methane gases were between 25-35% of span, all mid-range methane gases were between 45-55% of span, and all high range methane gases were between 80-90% of span. The zero calibrations for all analyzers were conducted using pre-purified grade Nitrogen. Purified hydrogen and air was used to fuel the FID.

Table 5-2 lists the gases used in this test program:

TABLE 5-2 REFERENCE METHOD EPA CALIBRATION GASES

Approximate Span	Allowable Values (based on Approximate Span)	Gas Level	Gas Value	Cylinder Number	Cylinder Expiration
O_2 0-22.7 %	22.7 9.1-13.6 0 – 4.5	High Mid Low	22.7 11.34 -	CC18310 EB0056130 CC19897	05/29/2021 05/29/2022 -
CO_2 0-19.85 %	19.85 7.9 – 11.9 0 – 4.0	High Mid Low	19.85 9.86 -	CC18310 EB0056130 CC19897	05/29/2021 05/29/2022 -
NOx 0-94.87 PPM	94.87 37.9 – 56.9 0 – 19.0	High Mid Low	94.87 53.1 -	CC20172 CC113905 CC19897	04/02/2022 05/03/2017 -
SO_2 0-94.5 PPM	94.5 37.8 – 56.7 0 – 18.9	High Mid Low	94.5 48.6 -	CC20172 CC113905 CC19897	04/02/2022 05/03/2017 -
CO 0-1944 PPM	1944 777.6 – 1166.4 0 – 388.8	High Mid Low	1944 1006 -	CC143547 CC110180 CC19897	02/03/2020 02/03/2020 -

6. QUALITY CONTROL PROCEDURES

6.1 General

Throughout all phases of this test program strict attention was given to all testing to provide the highest quality of results possible.

All of CEMServices test equipment is of the highest quality available and undergoes routine maintenance to ensure top operating condition. This includes instruments, sample conditioners, sample lines, and probes.

Sampling was conducted by trained personnel with extensive experience in source sampling. All sampling and analysis were conducted in strict accordance with EPA test procedures (where available). The quality control procedures found in the EPA Quality Assurance Handbook for Air Pollution Measurement Systems were adhered to as well.

Analyzer calibrations were performed at the beginning of each test day. System calibrations were performed before and after each test run through the entire sampling system.

All calculations were conducted in strict accordance with the equations found in the individual EPA Reference Methods. Calculations were conducted on a computer and the input data was checked by a person other than the original calculator to ensure that it is correct. The entire staff of CEMServices is thoroughly familiar with all test methods used in this program and has extensive experience in source emission monitoring.

Appendix A

VOLUMETRIC FLOW AND MOISTURE CALCULATION SHEET

FACILITY: L&RR
UNIT : STACK OUTLET
DATE : 12/3/14

RUN ID# : 1
START TIME: 09:00
END TIME: 10:00

Ds (FT)	5.63
As (SQFT)	24.89
Y =	1.0098
PIT COEFF	0.84
IMP-1 (INT)	100
IMP-2 (INT)	100
IMP-3 (INT)	0
IMP-4 (INT)	550
IMP-1 (FIN)	190
IMP-2 (FIN)	101
IMP-3 (FIN)	4
IMP-4 (FIN)	571.3
% CO2 (OUT)	4.24
% O2 (OUT)	16.25
% CO (OUT)	0.09
% N2 (OUT)	79.42
P BAR	29.95
PSTK	0.00
FINAL METER	517.903
INT METER	409.700
MID CHECK	0.000
VM (CF) =	108.203

TRAV PT	DELTA P	SQ ROOT	DELTA H	DGM IN	DGM OUT	STACK TEMP
A1	0.007	0.08	0.62	41	41	804
2	0.010	0.10	0.88	48	48	834
3	0.010	0.10	0.88	51	51	854
4	0.012	0.11	1.06	54	54	946
5	0.015	0.12	1.32	59	59	985
6	0.015	0.12	1.32	64	64	998
7	0.012	0.11	1.06	70	70	931
8	0.010	0.10	0.88	73	73	973
B1	0.009	0.09	0.79	78	78	779
2	0.010	0.10	0.88	80	80	774
3	0.010	0.10	0.88	81	81	875
4	0.015	0.12	1.32	85	85	853
5	0.017	0.13	1.50	88	88	944
6	0.015	0.12	1.32	89	89	990
7	0.012	0.11	1.06	89	89	951
8	0.010	0.10	0.88	89	89	900
AVG:	0.012	0.11	1.04	71.2	71.2	899.4

TS ('R)=	1359.4	DELTA H (ABS) =	30.03
TM ('F)=	71.2	PS (ABS) =	29.95
TM ('R)=	531.2	VI (TOT) =	116.3

VM STD	=	17.64 (VM) (Y) (DELTA H ABS) / (TM)	108.95	DSCF
VW STD	=	.04707 (VI TOT)	5.47	CF
BWO	=	(VW STD)/(VW STD)+(VM STD)	0.048	
1-BWO	=	1 - BWO	0.952	
Md (DRY)	=	.44(%CO2)+.32(%O2)+.28(%CO)+.28(%N2)	29.33	LBS/LB
Ms (WET)	=	Md(1-BWO)+18(BWO)	28.79	LBS/LB
G	=	SQRT (TS / PS / MS)	1.26	
VS	=	85.49(CP)(G)(SQRT DELTA P)	9.74	FPS
Qs	=	3600(1-BWO)(VS)(AS)(17.64)(PS)/(TS)	322866	DSCFH
			5381	DSCFM
			14542	ACFM
			5651	WSCFM

CO EMISSION RATE CALCULATION

FACILTY:	L&RR	RUN ID#:	1
UNIT:	STACK OUTLET	START:	09:00
DATE:	12/3/14	END:	10:00

Cgas PPMdv =	875.80	Cgas % CO2 =	4.24
PPM @3% O2=	3371.36	Cgas % O2 =	16.25
M.W. CO =	28.01	FUEL FACTOR(Fd)=	8710
BWO % =	4.8	Qs DSCFH =	322866

Cd = Cgas X (M.W./385.6) / 1,000,000 =	6.36E-05	LBS/SCF
E=Cd X FUEL FACTOR X (20.9/20.9- %O2) =	2.491	LBS/MMBTU
PMR = CD X QS DSCFH =	20.54	LBS/HR

NOx EMISSION RATE CALCULATION

FACILTY:	L&RR	RUN ID#:	1
UNIT:	STACK OUTLET	START:	09:00
DATE:	12/3/14	END:	10:00

Cgas PPMdv =	2.38	Cgas % CO2 =	4.24
PPM @3% O2=	9.16	Cgas % O2 =	16.25
M.W. NO2 =	46.01	FUEL FACTOR(Fd)=	8710
BWO % =	4.8	Qs DSCFH =	322866

Cd = Cgas X 1.194 E-7	=	2.842E-07	LBS/SCF
E=Cd X FUEL FACTOR X (20.9/20.9-%O2)	=	0.011	LBS/MMBTU
PMR = CD X QS DSCFH	=	0.09	LBS/HR

SO2 EMISSION RATE CALCULATION

FACILTY:	L&RR	RUN ID#:	1
UNIT:	STACK OUTLET	START:	09:00
DATE:	12/3/14	END:	10:00

Cgas PPMdv =	0.00	Cgas % CO2 =	4.24
PPM @3% O2=	0.00	Cgas % O2 =	16.25
M.W. SO2 =	64.06	FUEL FACTOR(Fd)=	8710
BWO % =	4.8	Qs DSCFH =	322866

Cd = Cgas X (M.W./385.6) / 1,000,000 = 0.00E+00 LBS/SCF

E=Cd X FUEL FACTOR X (20.9/20.9-%O2) = 0.0000 LBS/MMBTU

PMR = CD X QS DSCFH = 0.00 LBS/HR

VOLUMETRIC FLOW AND MOISTURE CALCULATION SHEET

FACILITY: L&RR
UNIT : STACK OUTLET
DATE : 12/3/14

RUN ID# : 2
START TIME: 10:15
END TIME: 11:15

Ds (FT)	5.63
As (SQFT)	24.89
Y =	1.0098
PIT COEFF	0.84
IMP-1 (INT)	100
IMP-2 (INT)	100
IMP-3 (INT)	0
IMP-4 (INT)	550
IMP-1 (FIN)	190
IMP-2 (FIN)	101
IMP-3 (FIN)	4
IMP-4 (FIN)	571.3
% CO2 (OUT)	4.22
% O2 (OUT)	16.25
% CO (OUT)	0.09
% N2 (OUT)	79.44
P BAR	29.95
PSTK	0.00
FINAL METER	517.903
INT METER	409.700
MID CHECK	0.000
VM (CF) =	108.203

TRAV PT	DELTA P	SQ ROOT	DELTA H	DGM IN	DGM OUT	STACK TEMP
A1	0.007	0.08	0.62	41	41	804
2	0.010	0.10	0.88	48	48	834
3	0.010	0.10	0.88	51	51	854
4	0.012	0.11	1.06	54	54	946
5	0.015	0.12	1.32	59	59	985
6	0.015	0.12	1.32	64	64	998
7	0.012	0.11	1.06	70	70	931
8	0.010	0.10	0.88	73	73	973
B1	0.009	0.09	0.79	78	78	779
2	0.010	0.10	0.88	80	80	774
3	0.010	0.10	0.88	81	81	875
4	0.015	0.12	1.32	85	85	853
5	0.017	0.13	1.50	88	88	944
6	0.015	0.12	1.32	89	89	990
7	0.012	0.11	1.06	89	89	951
8	0.010	0.10	0.88	89	89	900
AVG:	0.012	0.11	1.04	71.19	71.19	899.44

TS ('R)=	1359.4	DELTA H (ABS) =	30.03
TM ('F)=	71.2	PS (ABS) =	29.95
TM ('R)=	531.2	VI (TOT) =	116.3

VM STD	=	17.64 (VM) (Y) (DELTA H ABS) / (TM)	=	108.95	DSCF
VW STD	=	.04707 (VI TOT)	=	5.47	CF
BWO	=	(VW STD)/(VW STD)+(VM STD)	=	0.048	
1-BWO	=	1 - BWO	=	0.952	
Md (DRY)	=	.44(%CO2)+.32(%O2)+.28(%CO)+.28(%N2)	=	29.33	LBS/LB
Ms (WET)	=	Md(1-BWO)+18(BWO)	=	28.78	LBS/LB
G	=	SQRT (TS / PS / MS)	=	1.26	
VS	=	85.49(CP)(G)(SQRT DELTA P)	=	9.74	FPS
Qs	=	3600(1-BWO)(VS)(AS)(17.64)(PS)/(TS)	=	322883	DSCFH
				5381	DSCFM
				14543	ACFM
				5652	WSCFM

CO EMISSION RATE CALCULATION

FACILTY:	L&RR	RUN ID#:	2
UNIT:	STACK OUTLET	START:	10:15
DATE:	12/3/14	END:	11:15

Cgas PPMdv =	865.20	Cgas % CO2 =	4.22
PPM @3% O2=	3330.55	Cgas % O2 =	16.25
M.W. CO =	28.01	FUEL FACTOR(Fd)=	8710
BWO % =	4.8	Qs DSCFH =	322883

Cd = Cgas X (M.W./385.6) / 1,000,000 =	6.28E-05	LBS/SCF
E=Cd X FUEL FACTOR X (20.9/20.9- %O2) =	2.460	LBS/MMBTU
PMR = CD X QS DSCFH =	20.29	LBS/HR

NOx EMISSION RATE CALCULATION

FACILTY:	L&RR	RUN ID#:	2
UNIT:	STACK OUTLET	START:	10:15
DATE:	12/3/14	END:	11:15

Cgas PPMdv =	2.42	Cgas % CO2 =	4.22
PPM @3% O2=	9.32	Cgas % O2 =	16.25
M.W. NO2 =	46.01	FUEL FACTOR(Fd)=	8710
BWO % =	4.8	Qs DSCFH =	322883

Cd = Cgas X 1.194 E-7	=	2.889E-07	LBS/SCF
E=Cd X FUEL FACTOR X (20.9/20.9-%O2)	=	0.011	LBS/MMBTU
PMR = CD X QS DSCFH	=	0.09	LBS/HR

SO2 EMISSION RATE CALCULATION

FACILTY:	L&RR	RUN ID#:	2
UNIT:	STACK OUTLET	START:	10:15
DATE:	12/3/14	END:	11:15

Cgas PPMdv =	0.00	Cgas % CO2 =	4.22
PPM @3% O2=	0.00	Cgas % O2 =	16.25
M.W. SO2 =	64.06	FUEL FACTOR(Fd)=	8710
BWO % =	4.8	Qs DSCFH =	322883

Cd = Cgas X (M.W./385.6) / 1,000,000 = 0.00E+00 LBS/SCF

E=Cd X FUEL FACTOR X (20.9/20.9-%O2) = 0.0000 LBS/MMBTU

PMR = CD X QS DSCFH = 0.00 LBS/HR

VOLUMETRIC FLOW AND MOISTURE CALCULATION SHEET

FACILITY: L&RR
UNIT : STACK OUTLET
DATE : 12/3/14

RUN ID# : 3
START TIME: 11:25
END TIME: 12:25

Ds (FT)	5.63
As (SQFT)	24.89
Y =	1.0098
PIT COEFF	0.84
IMP-1 (INT)	100
IMP-2 (INT)	100
IMP-3 (INT)	0
IMP-4 (INT)	550
IMP-1 (FIN)	190
IMP-2 (FIN)	101
IMP-3 (FIN)	4
IMP-4 (FIN)	571.3
% CO2 (OUT)	4.21
% O2 (OUT)	16.28
% CO (OUT)	0.09
% N2 (OUT)	79.42
P BAR	29.95
PSTK	0.00
FINAL METER	517.903
INT METER	409.700
MID CHECK	0.000
VM (CF) =	108.203

TRAV PT	DELTA P	SQ ROOT	DELTA H	DGM IN	DGM OUT	STACK TEMP
A1	0.007	0.08	0.62	41	41	804
2	0.010	0.10	0.88	48	48	834
3	0.010	0.10	0.88	51	51	854
4	0.012	0.11	1.06	54	54	946
5	0.015	0.12	1.32	59	59	985
6	0.015	0.12	1.32	64	64	998
7	0.012	0.11	1.06	70	70	931
8	0.010	0.10	0.88	73	73	973
B1	0.009	0.09	0.79	78	78	779
2	0.010	0.10	0.88	80	80	774
3	0.010	0.10	0.88	81	81	875
4	0.015	0.12	1.32	85	85	853
5	0.017	0.13	1.50	88	88	944
6	0.015	0.12	1.32	89	89	990
7	0.012	0.11	1.06	89	89	951
8	0.010	0.10	0.88	89	89	900
AVG:	0.012	0.11	1.04	71.19	71.19	899.44

TS ('R)= 1359.4 DELTA H (ABS) = 30.03
TM ('F)= 71.2 PS (ABS) = 29.95
TM ('R)= 531.2 VI (TOT) = 116.3

VM STD = 17.64 (VM) (Y) (DELTA H ABS) / (TM) = 108.95 DSCF

VW STD = .04707 (VI TOT) = 5.47 CF

BWO = (VW STD)/(VW STD)+(VM STD) = 0.048

1-BWO = 1 - BWO = 0.952

Md (DRY) = .44(%CO2)+.32(%O2)+.28(%CO)+.28(%N2) = 29.32 LBS/LB

Ms (WET) = Md(1-BWO)+18(BWO) = 28.78 LBS/LB

G = SQRT (TS / PS / MS) = 1.26

VS = 85.49(CP)(G)(SQRT DELTA P) = 9.74 FPS

Qs = 3600(1-BWO)(VS)(AS)(17.64)(PS)/(TS) = 322885 DSCFH
5381 DSCFM
14543 ACFM
5652 WSCFM

CO EMISSION RATE CALCULATION

FACILTY:	L&RR	RUN ID#:	3
UNIT:	STACK OUTLET	START:	11:25
DATE:	12/3/14	END:	12:25

Cgas PPMdv =	866.60	Cgas % CO2 =	4.21
PPM @3% O2=	3357.61	Cgas % O2 =	16.28
M.W. CO =	28.01	FUEL FACTOR(Fd)=	8710
BWO % =	4.8	Qs DSCFH =	322885

Cd = Cgas X (M.W./385.6) / 1,000,000 = 6.29E-05 LBS/SCF

E=Cd X FUEL FACTOR X (20.9/20.9- %O2) = 2.480 LBS/MMBTU

PMR = CD X QS DSCFH = 20.33 LBS/HR

NOx EMISSION RATE CALCULATION

FACILTY:	L&RR	RUN ID#:	3
UNIT:	STACK OUTLET	START:	11:25
DATE:	12/3/14	END:	12:25

Cgas PPMdv =	2.29	Cgas % CO2 =	4.21
PPM @3% O2=	8.87	Cgas % O2 =	16.28
M.W. NO2 =	46.01	FUEL FACTOR(Fd)=	8710
BWO % =	4.8	Qs DSCFH =	322885

Cd = Cgas X 1.194 E-7	=	2.734E-07	LBS/SCF
E=Cd X FUEL FACTOR X (20.9/20.9-%O2)	=	0.011	LBS/MMBTU
PMR = CD X QS DSCFH	=	0.09	LBS/HR

SO2 EMISSION RATE CALCULATION

FACILTY:	L&RR	RUN ID#:	3
UNIT:	STACK OUTLET	START:	11:25
DATE:	12/3/14	END:	12:25

Cgas PPMdv =	0.15	Cgas % CO2 =	4.21
PPM @3% O2=	0.58	Cgas % O2 =	16.28
M.W. SO2 =	64.06	FUEL FACTOR(Fd)=	8710
BWO % =	4.8	Qs DSCFH =	322885

Cd = Cgas X (M.W./385.6) / 1,000,000 = 2.49E-08 LBS/SCF

E=Cd X FUEL FACTOR X (20.9/20.9-%O2) = 0.0010 LBS/MMBTU

PMR = CD X QS DSCFH = 0.01 LBS/HR

Appendix B

VELOCITY TRAVERSE DATA AND VOLUMETRIC FLOWRATE CALCULATIONS

FACILITY:	L&RR						RUN ID# :	1
UNIT :	FLARE						START TIME:	12:13
DATE :	12-02-14						END TIME:	13:27
		TRAV PT	DELTA P	SQ ROOT	DELTA H	DGM IN	DGM OUT	STACK TEMP
Ds (FT)	5.63	A1	0.008	0.09	0.80	66	66	796
As (SQFT)	24.85	2	0.010	0.10	1.00	66	66	770
Y =	1.0011	3	0.011	0.10	1.10	67	67	983
PIT COEFF	0.84	4	0.011	0.10	1.10	68	68	776
Dn (IN)	0.690	5	0.015	0.12	1.50	69	69	855
An (SQFT)	0.00260	6	0.014	0.12	1.40	70	70	911
IMP-1 (INT)	100	7	0.014	0.12	1.40	70	70	770
IMP-2 (INT)	100	8	0.008	0.09	0.80	70	70	853
IMP-3 (INT)	0	B1	0.008	0.09	0.80	73	73	868
IMP-4 (INT)	550	2	0.010	0.10	1.00	76	76	770
IMP-1 (FIN)	116	3	0.010	0.10	1.00	77	77	888
IMP-2 (FIN)	112	4	0.014	0.12	1.40	77	77	978
IMP-3 (FIN)	1	5	0.014	0.12	1.40	77	77	784
IMP-4 (FIN)	555.9	6	0.012	0.11	1.20	77	77	935
% CO2 (OUT)	4.32	7	0.010	0.10	1.00	79	79	936
% O2 (OUT)	16.16	8	0.010	0.10	1.00	80	80	771
% CO (OUT)	0.08							
% N2 (OUT)	79.44							

P BAR	30.55							
PSTK	0.00							
FINAL METER	963.885							
INT METER	928.700							
VM (CF)	35.185	AVG:	0.011	0.11	1.12	72.63	72.63	852.75
RUN TIME	60	TS ('R)=		1312.8	DELTA H (ABS)	=		30.63
F-FACTOR	8710	TM ('F)=		72.6	PS (ABS)	=		30.55
		TM ('R)=		532.6	VI (TOT)	=		34.9

VM STD	=	17.64 (VM) (Y) (DELTA H ABS) / (TM)	=	35.73 DSCF
VW STD	=	.04707 (VI TOT)	=	1.64 CF
BWO	=	(VW STD)/(VW STD)+(VM STD)	=	0.044
Md (DRY)	=	.44(%CO2)+.32(%O2)+.28(%CO)+.28(%N2)	=	29.34 LBS/MOLE
Ms (WET)	=	Md(1-BWO)+18(BWO)	=	28.84 LBS/MOLE
G	=	SQRT (TS / PS / MS)	=	1.22
VS	=	85.49(CP)(G)(SQRT DELTA P)	=	9.22 FPS
H	=	0.002669 (VI TOT)	=	0.09
J	=	(DELTA H ABS) (VM) (Y) / (TM)	=	2.03
K	=	(H) + (J)	=	2.12
% ISO	=	((TS)(K)(1.667))/ ((TIME)(VS)(PS)(AN))	=	105.6 %
Qs	=	3600(1-BWO)(VS)(AS)(17.64)(PS)/(TS)	=	323817 DSCFH
				5397 DSCFM
				5645 WSCFM

HCL EMISSIONS CALCULATION SHEET

FACILITY: L&RR
UNIT : FLARE
DATE : 12-02-14

RUN ID# 1
START: 12:13
END: 13:27

SAMPLE ANALYTE SUMMARY REPORT

VOLUME (ml)
329

IMP 1,2,3,RINSE - MICROGRAMS PER SAMPLE = 770 ug

TOTAL (ug) - MICROGRAMS PER SAMPLE = 770 ug

MOLECULAR WEIGHT OF HYDORGEN CHLORIDE (HCL) = 36.46

BLANK ANALYTE SUMMARY REPORT

VOLUME (ml)
300

BLANK
TOTAL BLANK - MICROGRAMS PER SAMPLE = 200.00 ug

VM STD = 17.64 * (VM)*Y*DELTA H ABS) / (TM) = 35.73 DSCF

Qs = 3600(1-BWO)(VS)(AS)(17.64)(PS)/(TS) = 323817 DSCFH

CS = (2.205 X 10-9) (ug) / (VM STD) = 4.75E-08 LBS/DSCF

CS' = 0.0000154 (ug) / (VM STD) = 3.32E-04 GRAINS /DSCF

$$PPMdv = \frac{CS * 1000000}{(MW\ HCL) / 385.6} = 0.50 \text{ PPM}$$

PPM @ 6% O2 = PPM * (14.9 / (20.9 - %O2)) = 1.58 PPM @ 6% O2

PMR = (QS) (CS) = 0.02 LBS/HR

Em = PPM * M.W/385.6/1,000,000*Fd*20.9/(20.9-O2) = 0.0018 LBS/MMBtu

VELOCITY TRAVERSE DATA AND VOLUMETRIC FLOWRATE CALCULATIONS

FACILITY:	L&RR						RUN ID# :	2
UNIT :	FLARE						START TIME:	16:08
DATE :	12-02-14						END TIME:	17:04
		TRAV PT	DELTA P	SQ ROOT	DELTA H	DGM IN	DGM OUT	STACK TEMP
Ds (FT)	5.63	B1	0.008	0.09	0.96	64	64	910
As (SQFT)	24.85	2	0.008	0.09	0.96	65	65	959
Y =	1.0011	3	0.010	0.10	1.20	65	65	746
PIT COEFF	0.84	4	0.010	0.10	1.20	65	65	792
Dn (IN)	0.750	5	0.015	0.12	1.80	66	66	992
An (SQFT)	0.00307	6	0.015	0.12	1.80	66	66	768
IMP-1 (INT)	100	7	0.013	0.11	1.56	68	68	878
IMP-2 (INT)	100	8	0.013	0.11	1.56	69	69	810
IMP-3 (INT)	0	A1	0.008	0.09	0.96	69	69	756
IMP-4 (INT)	550	2	0.009	0.09	1.08	69	69	936
IMP-1 (FIN)	126	3	0.010	0.10	1.20	69	69	900
IMP-2 (FIN)	113	4	0.013	0.11	1.56	69	69	962
IMP-3 (FIN)	1	5	0.015	0.12	1.80	71	71	982
IMP-4 (FIN)	556.5	6	0.015	0.12	1.80	73	73	986
% CO2 (OUT)	4.36	7	0.013	0.11	1.56	73	73	899
% O2 (OUT)	16.17	8	0.010	0.10	1.20	73	73	965
% CO (OUT)	0.08							
% N2 (OUT)	79.39							

P BAR	30.51						
PSTK	0.00						
FINAL METER	1002.775						
INT METER	964.600						
VM (CF)	38.175	AVG:	0.01	0.11	1.39	68.38	68.38	890.06
RUN TIME	60	TS ('R)=		######	DELTA H (ABS)	=		30.61
F-FACTOR	8710	TM ('F)=		68.4	PS (ABS)	=		30.51
		TM ('R)=		528.4	VI (TOT)	=		46.5

VM STD	=	17.64 (VM) (Y) (DELTA H ABS) / (TM)	=	39.06 DSCF
VW STD	=	.04707 (VI TOT)	=	2.19 CF
BWO	=	(VW STD)/(VW STD)+(VM STD)	=	0.053
Md (DRY)	=	.44(%CO2)+.32(%O2)+.28(%CO)+.28(%N2)	=	29.34 LBS/MOLE
Ms (WET)	=	Md(1-BWO)+18(BWO)	=	28.74 LBS/MOLE
G	=	SQRT (TS / PS / MS)	=	1.24
VS	=	85.49(CP)(G)(SQRT DELTA P)	=	9.52 FPS
H	=	0.002669 (VI TOT)	=	0.12
J	=	(DELTA H ABS) (VM) (Y) / (TM)	=	2.21
K	=	(H) + (J)	=	2.34
% ISO	=	((TS)(K)(1.667))/ ((TIME)(VS)(PS)(AN))	=	98.4 %
Qs	=	3600(1-BWO)(VS)(AS)(17.64)(PS)/(TS)	=	321438 DSCFH
				5357 DSCFM
				5658 WSCFM

HCL EMISSIONS CALCULATION SHEET

FACILITY: L&RR
UNIT : FLARE
DATE : 12-02-14

RUN ID#: 2
START: 16:08
END: 17:04

SAMPLE ANALYTE SUMMARY REPORT

VOLUME (ml) 340

IMP 1,2,3,RINSE - MICROGRAMS PER SAMPLE = 810 ug

TOTAL (ug) - MICROGRAMS PER SAMPLE = 810.0 ug

MOLECULAR WEIGHT OF HYDORGEN CHLORIDE (HCL) = 36.46

BLANK ANALYTE SUMMARY REPORT

VOLUME (ml) 300

BLANK
TOTAL BLANK - MICROGRAMS PER SAMPLE = 200.00 ug

VM STD = 17.64 * (VM)*Y*DELTA H ABS) / (TM) = 39.06 DSCF

Qs = 3600(1-BWO)(VS)(AS)(17.64)(PS)/(TS) = 321438 DSCFH

CS = (2.205 X 10-9) (ug) / (VM STD) = 4.57E-08 LBS/DSCF

CS' = 0.0000154 (ug) / (VM STD) = 3.19E-04 GRAINS /DSCF

$$PPMdv = \frac{CS * 1000000}{(MW\ HCL) / 385.6} = 0.48 \text{ PPM}$$

PPM @ 6% O2 = PPM * (14.9 / (20.9 - %O2)) = 1.52 PPM @ 6% O2

PMR = (QS) (CS) = 0.01 LBS/HR

Em = PPM * M.W/385.6/1,000,000*Fd*20.9/(20.9-O2) = 0.0018 LBS/MMBtu

VELOCITY TRAVERSE DATA AND VOLUMETRIC FLOWRATE CALCULATIONS

FACILITY:	L&RR							RUN ID# :	3
UNIT :	FLARE							START TIME:	12:50
DATE :	12/3/2014							END TIME:	14:00
		TRAV PT	DELTA P	SQ ROOT	DELTA H	DGM IN	DGM OUT	STACK TEMP	
Ds (FT)	5.63	A1	0.009	0.09	1.08	77	77	906	
As (SQFT)	24.85	2	0.009	0.09	1.08	75	75	921	
Y =	1.0011	3	0.011	0.10	1.32	75	75	774	
PIT COEFF	0.84	4	0.015	0.12	1.80	75	75	965	
Dn (IN)	0.750	5	0.015	0.12	1.80	75	75	845	
An (SQFT)	0.00307	6	0.012	0.11	1.44	75	75	781	
IMP-1 (INT)	100	7	0.010	0.10	1.20	75	75	962	
IMP-2 (INT)	100	8	0.010	0.10	1.20	75	75	810	
IMP-3 (INT)	0	B1	0.010	0.10	1.20	75	75	864	
IMP-4 (INT)	550	2	0.011	0.10	1.32	75	75	972	
IMP-1 (FIN)	124	3	0.011	0.10	1.32	75	75	777	
IMP-2 (FIN)	110	4	0.012	0.11	1.44	76	76	902	
IMP-3 (FIN)	1	5	0.015	0.12	1.80	76	76	930	
IMP-4 (FIN)	558.7	6	0.015	0.12	1.80	76	76	967	
% CO2 (OUT)	4.19	7	0.011	0.10	1.32	76	76	968	
% O2 (OUT)	16.29	8	0.009	0.09	1.08	76	76	826	
% CO (OUT)	0.08								
% N2 (OUT)	79.44								
%O2 WET CEM	4.25								
P BAR	29.85								
PSTK	0.00								
FINAL METER	42.417								
INT METER	3.100								
VM (CF)	39.317	AVG:	0.01	0.11	1.39	75.44	75.44	885.63	
RUN TIME	60	TS ('R)=		######	DELTA H (ABS) =			29.95	
F-FACTOR	8710	TM ('F)=		75.4	PS (ABS) =			29.85	
		TM ('R)=		535.4	VI (TOT) =			43.7	

VM STD	=	17.64 (VM) (Y) (DELTA H ABS) / (TM)	38.84	DSCF
VW STD	=	.04707 (VI TOT)	2.06	CF
BWO	=	(VW STD)/(VW STD)+(VM STD)	0.050	
Md (DRY)	=	.44(%CO2)+.32(%O2)+.28(%CO)+.28(%N2)	29.32	LBS/MOLE
Ms (WET)	=	Md(1-BWO)+18(BWO)	28.75	LBS/MOLE
G	=	SQRT (TS / PS / MS)	1.25	
VS	=	85.49(CP)(G)(SQRT DELTA P)	9.63	FPS
H	=	0.002669 (VI TOT)	0.12	
J	=	(DELTA H ABS) (VM) (Y) / (TM)	2.20	
K	=	(H) + (J)	2.32	
% ISO	=	((TS)(K)(1.667))/ ((TIME)(VS)(PS)(AN))	98.3	%
Qs	=	3600(1-BWO)(VS)(AS)(17.64)(PS)/(TS)	320079	DSCFH
			5335	DSCFM
			5617	WSCFM

HCL EMISSIONS CALCULATION SHEET

FACILITY: L&RR
UNIT : FLARE
DATE : ########

RUN ID#: 3
START: 12:50
END: 14:00

SAMPLE ANALYTE SUMMARY REPORT — VOLUME (ml) 335

IMP 1,2,3,RINSE - MICROGRAMS PER SAMPLE = 1000 ug

TOTAL (ug) - MICROGRAMS PER SAMPLE = 1000.0 ug

MOLECULAR WEIGHT OF HYDORGEN CHLORIDE (HCL) = 36.46

BLANK ANALYTE SUMMARY REPORT — VOLUME (ml) 300

BLANK
TOTAL BLANK - MICROGRAMS PER SAMPLE = 200.00 ug

VM STD = 17.64 * (VM)*Y*DELTA H ABS) / (TM) = 38.84 DSCF

Qs = 3600(1-BWO)(VS)(AS)(17.64)(PS)/(TS) = 320079 DSCFH

CS = (2.205 X 10-9) (ug) / (VM STD) = 5.68E-08 LBS/DSCF

CS' = 0.0000154 (ug) / (VM STD) = 3.97E-04 GRAINS /DSCF

$$PPMdv = \frac{CS * 1000000}{(MW\ HCL) / 385.6} = 0.60 \text{ PPM}$$

PPM @ 6% O2 = PPM * (14.9 / (20.9 - %O2)) = 1.94 PPM @ 6% O2

PMR = (QS) (CS) = 0.02 LBS/HR

Em = PPM * M.W/385.6/1,000,000*Fd*20.9/(20.9-O2) = 0.0022 LBS/MMBtu

Appendix C

TGNMO EMISSION RATE and EFFICIENCY CALCULATION

FACILTY:	L&RR LANDFILL	RUN ID#:	1
UNIT:	FLARE STACK	START:	10:55
DATE:	12/2/2014	END:	11:55

INLET	**PPM**	**UG/M3**	**OUTLET**	**PPM**	**UG/M3**
CO	255		CO	292	
CH4	244739		CH4	5701	
CO2	213087		CO2	48291	
Non Cond.	102		Non Cond.	75	
Cond.	1195		Cond.	25	
TGNMO	1195	597000	TGNMO	100	50000
M.W. CH4	=	16.04	M.W. CH4	=	16.04
Qs DSCFH	=	27799 DSCFH	Qs DSCFH	=	337923 DSCFH
Cd LBS/SCF	=	4.971E-05 LBS/SCF	Cd LBS/SCF	=	4.160E-06 LBS/SCF
PMR	=	1.38 LB/HR	PMR	=	1.41 LB/HR

Destruction Efficiency = -1.72 % (Based on lb/hr emissions calculations)

Destruction Efficiency = 91.63 % (Based on ppm concentrations)

CALCULATIONS:

Cd = Cgas X (M.W./385.6) / 1,000,000

PMR = CD X QS WSCFH

Destruction Efficiency = ((IN-OUT)/IN)*100

Outlet Qs DSCFH data from Dioxin run performed at the same time

TGNMO EMISSION RATE and EFFICIENCY CALCULATION

FACILTY:	L&RR LANDFILL	RUN ID#:	2
UNIT:	FLARE STACK	START:	13:05
DATE:	12/2/2014	END:	14:05

INLET	**PPM**	**UG/M3**	**OUTLET**	**PPM**	**UG/M3**
CO	238		CO	593	
CH4	304700		CH4	4576	
CO2	263892		CO2	37717	
Non Cond.	96		Non Cond.	68	
Cond.	1328		Cond.	18	
TGNMO	1328	663000	TGNMO	86	43000
M.W. CH4	=	16.04	M.W. CH4	=	16.04
Qs DSCFH	=	27021 DSCFH	Qs DSCFH	=	337923 DSCFH
Cd LBS/SCF =	=	5.524E-05 LBS/SCF	Cd LBS/SCF	=	3.577E-06 LBS/SCF
PMR	=	1.49 LB/HR	PMR	=	1.21 LB/HR

Destruction Efficiency = 19.01 % (Based on 1b/hr emissions calculations)

Destruction Efficiency = 93.52 % (Based on ppm concentrations)

CALCULATIONS:

Cd = Cgas X (M.W./385.6) / 1,000,000

PMR = CD X QS WSCFH

Destruction Efficiency = ((IN-OUT)/IN)*100

Outlet Qs DSCFH data from Dioxin run performed at the same time

TGNMO EMISSION RATE and EFFICIENCY CALCULATION

FACILTY:	L&RR LANDFILL	RUN ID#:	3
UNIT:	FLARE STACK	START:	15:30
DATE:	12/2/2014	END:	16:30

INLET	**PPM**	**UG/M3**	**OUTLET**	**PPM**	**UG/M3**
CO	332		CO	828	
CH4	291320		CH4	5791	
CO2	256101		CO2	52284	
Non Cond.	133		Non Cond.	77	
Cond.	1314		Cond.	157	
TGNMO	1314	656000	TGNMO	234	117000
M.W. CH4	=	16.04	M.W. CH4	=	16.04
Qs DSCFH	=	29882 DSCFH	Qs DSCFH	=	339170 DSCFH
Cd LBS/SCF =	=	5.466E-05 LBS/SCF	Cd LBS/SCF	=	9.734E-06 LBS/SCF
PMR	=	1.63 LB/HR	PMR	=	3.30 LB/HR

Destruction Efficiency = -102.13 % (Based on lb/hr emissions calculations)

Destruction Efficiency = 82.19 % (Based on ppm concentrations)

CALCULATIONS:

Cd = Cgas X (M.W./385.6) / 1,000,000

PMR = CD X QS WSCFH

Destruction Efficiency = ((IN-OUT)/IN)*100

VOLUMETRIC FLOWRATE CALCULATION SHEET

FACILITY: L&RR
UNIT: FLARE
DATE: 12/2/14

RUN ID#: IN-1
START TIME: 12:00
END TIME: 12:10

		TRAV PT	DELTA P	SQUARE ROOT	STACK TEMP
Ds (FT)	0.67				
As (SQFT)	0.35				
		A1	0.00	0.00	97
PIT COEFF	0.99	2	0.00	0.00	97
		3	0.00	0.00	97
P BAR	30.54	4	0.26	0.51	98
		5	0.31	0.56	98
P STK	5.00	6	0.32	0.57	98
		7	0.31	0.56	98
BWO	0.020	8	0.28	0.53	97
1 - BWO	0.980				
TS (R')	557.50				
PS (ABS)	30.91				
Ms (WET)	28.00				
		AVERAGE:	0.19	0.34	97.50

G	=	SQRT (TS / PS/ MS)	0.80	
VS	=	85.49(CP) (G) (SQRT DELTA P)	23.08	FPS
Qs	=	3600(1-BWO)(VS)(AS)(17.64)(PS)/(TS)	27799	DSCFH
		DSCFH / 60	463	DSCFM
		(VS) (AS) (60)	483	ACFM
		(DSCFM) / (1-BWO)	**473**	WSCFM

VOLUMETRIC FLOWRATE CALCULATION SHEET

FACILITY: L&RR
UNIT: FLARE
DATE: 12/2/14

RUN ID#: IN-2
START TIME: 14:10
END TIME: 14:20

		TRAV PT	DELTA P	SQUARE ROOT	STACK TEMP
Ds (FT)	0.67				
As (SQFT)	0.35				
		A1	0.00	0.00	98
PIT COEFF	0.99	2	0.00	0.00	98
		3	0.00	0.00	98
P BAR	30.51	4	0.24	0.49	97
		5	0.28	0.53	97
P STK	5.00	6	0.29	0.54	98
		7	0.30	0.55	98
BWO	0.020	8	0.29	0.54	97
1 - BWO	0.980				
TS (R')	557.63				
PS (ABS)	30.88				
Ms (WET)	28.00				
		AVERAGE:	0.18	0.33	97.63

G = SQRT (TS / PS/ MS) 0.80

VS = 85.49(CP) (G) (SQRT DELTA P) 22.46 FPS

Qs = 3600(1-BWO)(VS)(AS)(17.64)(PS)/(TS) 27021 DSCFH

DSCFH / 60 450 DSCFM

(VS) (AS) (60) 470 ACFM

(DSCFM) / (1-BWO) **460** WSCFM

VOLUMETRIC FLOWRATE CALCULATION SHEET

FACILITY: L&RR
UNIT: FLARE
DATE: 12/2/14

RUN ID#: IN-3
START TIME: 16:40
END TIME: 16:50

		TRAV PT	DELTA P	SQUARE ROOT	STACK TEMP
Ds (FT)	0.67				
As (SQFT)	0.35				
		A1	0.00	0.00	97
PIT COEFF	0.99	2	0.00	0.00	98
		3	0.03	0.17	98
P BAR	30.51	4	0.23	0.48	98
		5	0.30	0.55	98
P STK	5.00	6	0.34	0.58	97
		7	0.34	0.58	97
BWO	0.020	8	0.31	0.56	97
1 - BWO	0.980				
TS (R')	557.50				
PS (ABS)	30.88				
Ms (WET)	28.00				
		AVERAGE:	0.19	0.37	97.50

G	=	SQRT (TS / PS/ MS)	0.80	
VS	=	85.49(CP) (G) (SQRT DELTA P)	24.84	FPS
Qs	=	3600(1-BWO)(VS)(AS)(17.64)(PS)/(TS)	29882	DSCFH
		DSCFH / 60	498	DSCFM
		(VS) (AS) (60)	520	ACFM
		(DSCFM) / (1-BWO)	**508**	WSCFM

Appendix D

DIOXIN INPUT DATA SHEET

PLANT:	L&RR LANDFILL	RUN # :	1
LOCATION:	FLARE STACK	DATE :	02-Dec-14

As (SQFT) :	24.85
An (INCHES)	0.655
PITOT COEFFICIENT:	0.84
IMP-1+2 (INT) :	100
IMP-3 (INT) :	100
IMP-4 (INT) :	0
IMP-5 (INT) :	550
IMP-1+2 (FIN) :	165
IMP-3 (FIN) :	100
IMP-4 (FIN) :	1
IMP-5 (FIN) :	567.2
% CO2 (OUT):	4.32
% O2 (OUT) :	16.16
% CO (OUT) :	0
Pbar	30.54
Pstack	0.00
NUMBER OF POINTS	12
TEST LENGTH	180
FINAL METER	310.030
INTIAL METER	214.100
BEGIN TIME	11:13
END TIME	14:25

TRAVERSE POINT	VELOCITY HEAD	SQUARE ROOT	DELTA H	DRY GAS METER IN	DRY GAS METER OUT	STACK TEMP (F)
B1	0.009	0.095	0.64	49	49	892
2	0.010	0.100	0.71	54	54	706
3	0.015	0.122	1.06	59	59	827
4	0.014	0.118	0.99	64	64	802
5	0.015	0.122	1.06	69	69	776
6	0.015	0.122	1.06	73	73	770
7	0.014	0.118	0.99	76	76	811
8	0.010	0.100	0.71	79	79	833
A1	0.007	0.084	0.5	82	82	819
2	0.010	0.100	0.71	85	85	957
3	0.015	0.122	1.06	86	86	967
4	0.015	0.122	1.06	86	86	945
5	0.014	0.118	0.99	89	89	889
6	0.010	0.100	0.71	89	89	977
7	0.010	0.100	0.71	89	89	801
8	0.010	0.100	0.71	90	90	795
AVERAGE:	0.012	0.109	0.85	76.2	76.2	847.9

INPUT DATA SHEET

PLANT :	L&RR LANDFILL	RUN # :	2
LOCATION :	FLARE STACK	DATE :	02-Dec-14

As (SQFT) :	24.85
An (INCHES)	0.655
PITOT COEFFICIENT:	0.84
IMP-1+2 (INT) :	100
IMP-3 (INT) :	100
IMP-4 (INT) :	0
IMP-5 (INT) :	550
IMP-1+2 (FIN) :	165
IMP-3 (FIN) :	100
IMP-4 (FIN) :	0
IMP-5 (FIN) :	566.9
% CO2 (OUT):	4.36
% O2 (OUT) :	16.17
% CO (OUT) :	0
Pbar	30.51
Pstack	0.00
NUMBER OF POINTS	12
TEST LENGTH	180
FINAL METER	409.060
INTIAL METER	311.100
BEGIN TIME	15:08
END TIME	18:14

TRAVERSE POINT	VELOCITY HEAD	SQUARE ROOT	DELTA H	DRY GAS METER IN	DRY GAS METER OUT	STACK TEMP (F)
A1	0.009	0.095	0.64	82	82	840
2	0.009	0.095	0.64	78	78	913
3	0.012	0.110	0.85	76	76	975
4	0.015	0.122	1.06	75	75	987
5	0.015	0.122	1.06	75	75	970
6	0.015	0.122	1.06	75	75	912
7	0.012	0.110	0.85	76	76	761
8	0.012	0.110	0.85	78	78	789
B1	0.010	0.100	0.71	79	79	845
2	0.010	0.100	0.71	79	79	778
3	0.012	0.110	0.85	81	81	854
4	0.015	0.122	1.06	82	82	954
5	0.017	0.130	1.21	82	82	977
6	0.017	0.130	1.21	84	84	990
7	0.012	0.110	0.85	84	84	961
8	0.010	0.100	0.71	84	84	939
AVERAGE:	0.013	0.112	0.90	79.4	79.4	902.8

INPUT DATA SHEET

PLANT :	L&RR LANDFILL	RUN # :	3
LOCATION :	FLARE STACK	DATE :	03-Dec-14

As (SQFT) :	24.85
An (INCHES)	0.69
PITOT COEFFICIENT:	0.84
IMP-1+2 (INT) :	100
IMP-3 (INT) :	100
IMP-4 (INT) :	0
IMP-5 (INT) :	550
IMP-1+2 (FIN) :	190
IMP-3 (FIN) :	101
IMP-4 (FIN) :	4
IMP-5 (FIN) :	571.3
% CO2 (OUT):	4.22
% O2 (OUT) :	16.26
% CO (OUT) :	0
Pbar	29.75
Pstack	0.00
NUMBER OF POINTS	12
TEST LENGTH	180
FINAL METER	517.903
INTIAL METER	409.700
BEGIN TIME	9:00
END TIME	12:15

TRAVERSE POINT	VELOCITY HEAD	SQUARE ROOT	DELTA H	DRY GAS METER IN	DRY GAS METER OUT	STACK TEMP (F)
A1	0.007	0.084	0.62	41	41	804
2	0.010	0.100	0.88	48	48	834
3	0.010	0.100	0.88	51	51	854
4	0.012	0.110	1.06	54	54	946
5	0.015	0.122	1.32	59	59	985
6	0.015	0.122	1.32	64	64	998
7	0.012	0.110	1.06	70	70	931
8	0.010	0.100	0.88	73	73	973
B1	0.009	0.095	0.79	78	78	779
2	0.010	0.100	0.88	80	80	774
3	0.010	0.100	0.88	81	81	875
4	0.015	0.122	1.32	85	85	853
5	0.017	0.130	1.50	88	88	944
6	0.015	0.122	1.32	89	89	990
7	0.012	0.110	1.06	89	89	951
8	0.010	0.100	0.88	89	89	900
AVERAGE:	0.012	0.108	1.04	71.2	71.2	899.4

ISOKINETIC CALCULATION SHEET

PLANT :	**L&RR LANDFILL**	RUN # :	**1**
LOCATION :	**FLARE STACK**	DATE :	**02-Dec-14**

Ts (°F) =	847.9	% CO2 =	4.32	Vm (CF) =	95.930
Ts (°R) =	1307.9	% O2 =	16.16	DELTA H (ABS) =	30.60
Tm (°F) =	76.2	% CO =	0	Ps (ABS) =	30.54
Tm (°R) =	536.2	% N2 =	79.52	SQRT DELTA P =	0.1091
VI (TOT) =	83.2	Cp =	0.84	Y =	1.0098
		TIME =	180	An =	0.002340

Vm std = $\frac{17.64\ (Vm)(Y)(DELTA\ H\ ABS)}{(Tm)}$ = 97.529 DSCF

Vw std = .04707 (VI TOT) = 3.916 CF

Bwo = Vw std / (Vw std) + (Vm std) = 0.039

1 - Bwo = 1 - Bwo = 0.961

Md (DRY)= 0.44 (% CO2) + 0.32 (% O2) + 0.28 (% CO) + 0.28 (% N2) = 29.338 LB/LB MOLE

Ms (WET)= MD (1-Bwo) + 18 (Bwo) = 28.900 LB/LB MOLE

G = SQRT (Ts/Ps/Ms) = 1.217

Vs = 85.49 (Cp) (G) (SQRT DELTA P) = 9.539 FPS

Qs = 3600 (1-Bwo)(Vs)(As)(17.64)(Ps/Ts) = 337923 DSCFH

% ISO = $\frac{100\ (Ts)\ (Vm\ std)\ (Pstd)}{60\ (Tstd)\ (\ Vs\ )\ (Time)\ (\ An)\ (Ps)\ (1\text{-}Bwo)}$ = 102.13

ISOKINETIC CALCULATION SHEET

PLANT :	**L&RR LANDFILL**	RUN # :	**2**
LOCATION :	**FLARE STACK**	DATE :	**02-Dec-14**

Ts (°F) =	902.8	% CO2 =	4.36	Vm (CF) =	97.960
Ts (°R) =	1362.8	% O2 =	16.17	DELTA H (ABS) =	30.58
Tm (°F) =	79.4	% CO =	0	Ps (ABS) =	30.51
Tm (°R) =	539.4	% N2 =	79.47	SQRT DELTA P =	0.1118
Vl (TOT) =	81.9	Cp =	0.84	Y =	1.0098
Vl (adj) =	NA	TIME =	180	An =	0.002340

Vm std = $\frac{17.64\ (Vm)(Y)(DELTA\ H\ ABS)}{(Tm)}$ = 98.917 DSCF

Vw std = .04707 (Vl TOT) = 3.855 CF

Bwo = Vw std / (Vw std) + (Vm std) = 0.038

1 - Bwo = 1 - Bwo = 0.962

Md (DRY)= 0.44 (% CO2) + 0.32 (% O2) + 0.28 (% CO) + 0.28 (% N2) = 29.344 LB/LB MOLE

Ms (WET)= MD (1-Bwo) + 18 (Bwo) = 28.919 LB/LB MOLE

G = SQRT (Ts/Ps/Ms) = 1.243

Vs = 85.49 (Cp) (G) (SQRT DELTA P) = 9.974 FPS

Qs = 3600 (1-Bwo)(Vs)(As)(17.64)(Ps/Ts) = 339170 DSCFH

% ISO = $\frac{100\ (Ts)\ (Vm\ std)\ (Pstd)}{60\ (Tstd)\ (\ Vs\ )\ (Time)\ (\ An)\ (Ps)\ (1-Bwo)}$ = 103.20

ISOKINETIC CALCULATION SHEET

PLANT :	**L&RR LANDFILL**	RUN # :	**3**
LOCATION :	**FLARE STACK**	DATE :	**03-Dec-14**

Ts (°F) =	899.4	% CO2 =	4.22	Vm (CF) =	108.203
Ts (°R) =	1359.4	% O2 =	16.26	DELTA H (ABS) =	29.83
Tm (°F) =	71.2	% CO =	0	Ps (ABS) =	29.75
Tm (°R) =	531.2	% N2 =	79.52	SQRT DELTA P =	0.1080
Vl (TOT) =	116.3	Cp =	0.84	Y =	1.0098
Vl (adj) =	NA	TIME =	180	An =	0.002597

Vm std = $\frac{17.64\ (Vm)(Y)(\text{DELTA H ABS})}{(Tm)}$ = 108.225 DSCF

Vw std = .04707 (Vl TOT) = 5.474 CF

Bwo = Vw std / (Vw std) + (Vm std) = 0.048

1 - Bwo = 1 - Bwo = 0.952

Md (DRY)= 0.44 (% CO2) + 0.32 (% O2) + 0.28 (% CO) + 0.28 (% N2) = 29.326 LB/LB MOLE

Ms (WET)= MD (1-Bwo) + 18 (Bwo) = 28.780 LB/LB MOLE

G = SQRT (Ts/Ps/Ms) = 1.260

Vs = 85.49 (Cp) (G) (SQRT DELTA P) = 9.769 FPS

Qs = 3600 (1-Bwo)(Vs)(As)(17.64)(Ps/Ts) = 321146 DSCFH

% ISO = $\frac{100\ (Ts)\ (Vm\ std)\ (Pstd)}{60\ (Tstd)\ (\ Vs\ )\ (Time)\ (\ An)\ (Ps)\ (1\text{-}Bwo)}$ = 107.46

PCDD/DF EMISSION CALCULATION SHEET

PLANT:	L&RR LANDFILL	RUN #:	1
LOCATION:	FLARE STACK	DATE :	02-Dec-14

Analyte		Mn pg	Blank	Cs pg/DSCM	Cs' pg/DSCM @ 7 % O2	Cs' pg/DSCM @ 12 % CO2	PMR lb/hr
2378 Tetra CDD	<	3.1		1.122	3.291	3.118	2.368E-11
12378 Penta CDD	<	3.2		1.159	3.398	3.218	2.445E-11
123478 Hexa CDD	<	3.1		1.122	3.291	3.118	2.368E-11
123678 Hexa CDD	<	3.2		1.159	3.398	3.218	2.445E-11
123789 Hexa CDD	<	3.1		1.122	3.291	3.118	2.368E-11
1234678 Hepta CDD	<	3		1.086	3.185	3.017	2.292E-11
12346789 Octa CDD	<	4.8		1.738	5.096	4.827	3.667E-11
Total Tetra CDD	<	3.1		1.122	3.291	3.118	2.368E-11
Total Penta CDD	<	3.2		1.159	3.398	3.218	2.445E-11
Total Hexa CDD	<	5.1		1.846	5.415	5.129	3.896E-11
Total Hepta CDD	<	3.0		1.086	3.185	3.017	2.292E-11
2378 Tetra CDF		32		11.586	33.975	32.183	2.445E-10
12378 Penta CDF	<	3.2		1.159	3.398	3.218	2.445E-11
23478 Penta CDF	<	3.1		1.122	3.291	3.118	2.368E-11
123478 Hexa CDF	<	3.1		1.122	3.291	3.118	2.368E-11
123678 Hexa CDF	<	2.9		1.050	3.079	2.917	2.216E-11
234678 HexaCDF	<	3.4		1.231	3.610	3.419	2.598E-11
123789 Hexa CDF	<	3.8		1.376	4.035	3.822	2.903E-11
1234678 Hepta CDF	<	2.9		1.050	3.079	2.917	2.216E-11
1234789 Hepta CDF	<	3.8		1.376	4.035	3.822	2.903E-11
12346789 Octa CDF	<	6.3		2.281	6.689	6.336	4.813E-11
Total Tetra CDF		244		88.341	259.060	245.392	1.864E-09
Total Penta CDF		14.8		5.358	15.713	14.884	1.131E-10
Total Hexa CDF	<	3.3		1.195	3.504	3.319	2.521E-11
Total Hepta CDF	<	3.3		1.195	3.504	3.319	2.521E-11
Total Toxic Equivalency		10.5					
TOTAL PCDD/DF		**290.9**		**105.322**	**308.854**	**292.560**	**2.222E-09**
TOTAL PCDD/DF (TEF)				**3.802**	**11.148**	**10.560**	**8.022E-11**
Includes Octa CDD/CDF							

Blank is NOT substracted from the emission results

DATA:

Vm Standard (DSCF)	97.53
Qs (DSCFH)	337923
Corrected to % CO2	12.00
Corrected to % O2	7.00
% O2	16.16
% CO2	4.32

EQUATIONS:

Cs (ng/DSCM)	(Mn) / (Vm Std / 35.3)
Qs (DSCFH)	3600 (1-Bwo)(Vs)(As)(17.64)(Ps)/(Ts)
Qs (DSCFM)	Qs (DSCFH) (0.02832)
Cs' @ 12% CO2	(Cs) (12) / (%CO2)
Cs' @ 7% O2	(Cs) (20.9-7)/(20.9-%O2)
PMR (lbs/hr)	(Qs)(Cs)

PCDD/DF EMISSION CALCULATION SHEET

PLANT:	L&RR LANDFILL	RUN #:	2
LOCATION:	FLARE STACK	DATE :	02-Dec-14

Analyte		Mn pg	Blank	Cs pg/DSCM	Cs' pg/DSCM @ 7 % O2	Cs' pg/DSCM @ 12 % CO2	PMR lb/hr
2378 Tetra CDD	<	3.1		1.107	3.252	3.046	2.344E-11
12378 Penta CDD	<	3.1		1.107	3.252	3.046	2.344E-11
123478 Hexa CDD	<	3.2		1.142	3.357	3.144	2.419E-11
123678 Hexa CDD	<	3.3		1.178	3.462	3.242	2.495E-11
123789 Hexa CDD	<	3.2		1.142	3.357	3.144	2.419E-11
1234678 Hepta CDD		5.9		2.106	6.189	5.797	4.461E-11
12346789 Octa CDD		20.4		7.282	21.400	20.043	1.542E-10
Total Tetra CDD	<	3.1		1.107	3.252	3.046	2.344E-11
Total Penta CDD	<	3.1		1.107	3.252	3.046	2.344E-11
Total Hexa CDD	<	3.7		1.321	3.881	3.635	2.797E-11
Total Hepta CDD		10.7		3.820	11.225	10.513	8.090E-11
2378 Tetra CDF		7.7		2.749	8.078	7.565	5.822E-11
12378 Penta CDF	<	3.2		1.142	3.357	3.144	2.419E-11
23478 Penta CDF	<	3.0		1.071	3.147	2.947	2.268E-11
123478 Hexa CDF	<	2.9		1.035	3.042	2.849	2.193E-11
123678 Hexa CDF	<	2.7		0.964	2.832	2.653	2.041E-11
234678 HexaCDF	<	3.2		1.142	3.357	3.144	2.419E-11
123789 Hexa CDF	<	3.6		1.285	3.777	3.537	2.722E-11
1234678 Hepta CDF	<	2.7		0.964	2.832	2.653	2.041E-11
1234789 Hepta CDF	<	3.6		1.285	3.777	3.537	2.722E-11
12346789 Octa CDF	<	4.0		1.428	4.196	3.930	3.024E-11
Total Tetra CDF		13.6		4.855	14.267	13.362	1.028E-10
Total Penta CDF	<	3.1		1.107	3.252	3.046	2.344E-11
Total Hexa CDF	<	3.1		1.107	3.252	3.046	2.344E-11
Total Hepta CDF	<	3.1		1.107	3.252	3.046	2.344E-11
Total Toxic Equivalency		10.3					
TOTAL PCDD/DF TEF		**67.9**		**24.239**	**72.611**	**66.712**	**5.134E-10**
TOTAL PCDD/DF (TEF)				**3.677**	**10.805**	**10.120**	**2.271E-14**
Includes Octa CDD/CDF							

Blank is NOT substracted from the emission results

Vm Standard (DSCF)	98.92	Cs TEF(ng/dscm)	(Mn) (TEF) / (Vm Std / 35.3)
Qs (DSCFH)	339170	Qs (DSCFH)	3600 (1-Bwo)(Vs)(As)(17.64)(Ps)/(Ts)
Corrected to % CO2	12.00	Qs (DSCFM)	Qs (DSCFH) (0.02832)
Corrected to % O2	7.00	Cs'TEF 12% CO2	(Cs TEF) (12) / (%CO2)
% O2	16.17	Cs' TEF 7% O2	(Cs TEF) (20.9-7)/(20.9-%O2)
% CO2	4.36	PMR TEF (lbs/hr)	(Qs)(Cs TEF)

PCDD/DF EMISSION CALCULATION SHEET

PLANT:	L&RR LANDFILL	RUN #:	3
LOCATION:	FLARE STACK	DATE :	03-Dec-14

Analyte		Mn pg	Blank	Cs pg/DSCM	Cs' pg/DSCM @ 7 % O2	Cs' pg/DSCM @ 12 % CO2	PMR lb/hr
2378 Tetra CDD		5.4		1.762	5.278	5.010	3.533E-11
12378 Penta CDD		5.8		1.892	5.669	5.381	3.795E-11
123478 Hexa CDD	<	3.0		0.979	2.932	2.783	1.963E-11
123678 Hexa CDD		4.9		1.599	4.789	4.546	3.206E-11
123789 Hexa CDD		3.8		1.240	3.714	3.526	2.486E-11
1234678 Hepta CDD		15.5		5.057	15.150	14.381	1.014E-10
12346789 Octa CDD		24.1		7.863	23.556	22.360	1.577E-10
Total Tetra CDD		178		58.076	173.979	165.146	1.165E-09
Total Penta CDD		87.1		28.418	85.132	80.810	5.699E-10
Total Hexa CDD		63.3		20.653	61.870	58.729	4.142E-10
Total Hepta CDD		30.8		10.049	30.104	28.576	2.015E-10
2378 Tetra CDF	<	230		75.042	224.804	213.391	1.505E-09
12378 Penta CDF		18.2		5.938	17.789	16.886	1.191E-10
23478 Penta CDF		20.5		6.689	20.037	19.020	1.341E-10
123478 Hexa CDF		25.2		8.222	24.631	23.380	1.649E-10
123678 Hexa CDF		11.4		3.719	11.142	10.577	7.459E-11
234678 HexaCDF		8.1		2.643	7.917	7.515	5.300E-11
123789 Hexa CDF	<	3.5		1.142	3.421	3.247	2.290E-11
1234678 Hepta CDF		23.9		7.798	23.360	22.174	1.564E-10
1234789 Hepta CDF		3.9		1.272	3.812	3.618	2.552E-11
12346789 Octa CDF		5.8		1.892	5.669	5.381	3.795E-11
Total Tetra CDF		1510		492.670	1475.885	1400.956	9.880E-09
Total Penta CDF		294		95.924	287.358	272.769	1.924E-09
Total Hexa CDF		83.2		27.146	81.320	77.192	5.444E-10
Total Hepta CDF		36.7		11.974	35.871	34.050	2.401E-10
Total Toxic Equivalency		28.4					
TOTAL PCDD/DF		**2313**		**754.665**	**2260.743**	**2145.968**	**1.513E-08**
TOTAL PCDD/DF (TEF)				**9.266**	**27.758**	**26.349**	**1.858E-10**
Includes Octa CDD/CDF							

Blank is NOT substracted from the emission results

DATA:

Vm Standard (DSCF)	108.23
Qs (DSCFH)	321146
Corrected to % CO2	12.00
Corrected to % O2	7.00
% O2	16.26
% CO2	4.22

EQUATIONS:

Cs (ng/DSCM)	(Mn) / (Vm Std / 35.3)
Qs (DSCFH)	3600 (1-Bwo)(Vs)(As)(17.64)(Ps)/(Ts)
Qs (DSCFM)	Qs (DSCFH) (0.02832)
Cs' @ 12% CO2	(Cs) (12) / (%CO2)
Cs' @ 7% O2	(Cs) (20.9-7)/(20.9-%O2)
PMR (lbs/hr)	(Qs)(Cs)

PCB EMISSION CALCULATION SHEET

PLANT:	**L&RR LANDFILL**	**RUN #:**	**1**
LOCATION:	**FLARE STACK**	**DATE :**	**02-Dec-14**

Maxxam ID		YT2089	
Sampling Date		12/2/2014	
	Units	**M23-1**	**EDL**
2-MonoCB-(1)	ng	ND	7.5
3-MonoCB-(2)	ng	9.58	0.17
4-MonoCB-(3)	ng	5.62	0.17
22'-DiCB-(4)	ng	14.2	0.056
2,3-DiCB-(5)	ng	0.090	0.093
2,3'-DiCB-(6)	ng	2.82	0.083
2,4-DiCB-(7)	ng	0.657	0.088
2,4'-DiCB-(8)	ng	10.4	0.079
2,5-DiCB-(9)	ng	1.75	0.081
2,6-DiCB-(10)	ng	0.380	0.055
3,3'-DiCB-(11)	ng	1.27	0.085
DiCB-(12)+(13)	ng	3.57	0.087
3,5-DiCB-(14)	ng	0.238	0.082
4,4'-DiCB-(15)	ng	1.54	0.14
22'3-TriCB-(16)	ng	2.09	0.076
22'4-TriCB-(17)	ng	3.20	0.062
TriCB-(18)+(30)	ng	6.36	0.052
22'6-TriCB-(19)	ng	1.71	0.055
TriCB-(20) + (28)	ng	3.01	0.030
TriCB-(21)+(33)	ng	2.12	0.032
234'-TriCB-(22)	ng	0.939	0.034
235-TriCB-(23)	ng	ND	0.036
236-TriCB-(24)	ng	0.169	0.049
23'4-TriCB-(25)	ng	0.296	0.029
TriCB-(26)+(29)	ng	0.774	0.031
23'6-TriCB-(27)	ng	0.398	0.043
24'5-TriCB-(31)	ng	3.03	0.029
24'6-TriCB-(32)	ng	1.44	0.040
23'5'-TriCB-(34)	ng	ND	0.030
33'4-TriCB-(35)	ng	0.198	0.030
33'5-TriCB-(36)	ng	ND	0.027
344'-TriCB-(37)	ng	0.211	0.048
345-TriCB-(38)	ng	ND	0.062
34'5-TriCB-(39)	ng	ND	0.031
TetraCB-(40)+(41)+(71)	ng	0.33	0.10
22'34'-TetraCB-(42)	ng	0.19	0.12
22'35-TetraCB-(43)	ng	ND	0.14
TetraCB-(44)+(47)+(65)	ng	0.793	0.095
TetraCB-(45)+(51)	ng	0.46	0.10
22'36'-TetraCB-(46)	ng	0.13	0.12
22'45-TetraCB-(48)	ng	0.26	0.11
TetraCB-(49)+TetraCB-(69)	ng	0.552	0.088
TetraCB-(50)+(53)	ng	0.393	0.099
22'55'-TetraCB-(52)	ng	1.08	0.10
22'66'-TetraCB-(54)	ng	ND	0.047
233'4-TetraCB-(55)	ng	ND	0.045

233'4'-Tetra CB(56)	ng	ND	0.046	
233'5-TetraCB-(57)	ng	ND	0.042	PCB RUN 1
233'5'-TetraCB-(58)	ng	ND	0.043	
TetraCB-(59)+(62)+(75)	ng	ND	0.074	
2344'-TetraCB -(60)	ng	ND	0.046	
TetraCB-(61)+(70)+(74)+(76)	ng	0.280	0.043	
234'5-TetraCB-(63)	ng	ND	0.039	
234'6-TetraCB-(64)	ng	0.220	0.078	
23'44'-TetraCB-(66)	ng	0.105	0.041	
23'45-TetraCB-(67)	ng	ND	0.038	
23'45'-TetraCB-(68)	ng	ND	0.040	
23'55'-TetraCB-(72)	ng	ND	0.039	
23'5'6-TetraCB-(73)	ng	ND	0.072	
33'44'-TetraCB-(77)	ng	ND	0.048	
33'45-TetraCB-(78)	ng	ND	0.041	
33'45'-TetraCB(79)	ng	ND	0.036	
33'55'-TetraCB-(80)	ng	ND	0.037	
344'5-TetraCB-(81)	ng	ND	0.050	
22'33'4-PentaCB-(82)	ng	ND	0.094	
PentaCB-(83)+(99)	ng	ND	0.086	
22'33'6-PentaCB-(84)	ng	ND	0.093	
PentaCB-(85)+(116)+(117)	ng	ND	0.064	
PentaCB-(86)(87)(97)(109)(119)(125)	ng	ND	0.070	
PentaCB-(88)+(91)	ng	ND	0.083	
22'346'-PentaCB-(89)	ng	ND	0.086	
PentaCB-(90)+(101)+(113)	ng	0.115	0.069	
22'355'-PentaCB-(92)	ng	ND	0.082	
PentaCB-(93)+(98)+(100)+(102)	ng	ND	0.084	
22'356'-PentaCB-(94)	ng	ND	0.094	
22'35'6-PentaCB-(95)	ng	0.184	0.076	
22'366'-PentaCB-(96)	ng	ND	0.026	
22'45'6-PentaCB-(103)	ng	ND	0.071	
22'466'-PentaCB-(104)	ng	ND	0.023	
233'44'-PentaCB-(105)	ng	ND	0.052	
233'45-PentaCB-(106)	ng	ND	0.043	
233'4'5-PentaCB-(107)	ng	ND	0.039	
PentaCB-(108)+(124)	ng	ND	0.044	
PentaCB-(110)+(115)	ng	0.094	0.066	
233'55'-PentaCB-(111)	ng	ND	0.061	
233'56-PentaCB-(112)	ng	ND	0.058	
2344'5-PentaCB-(114)	ng	ND	0.050	
23'44'5-PentaCB-(118)	ng	ND	0.051	
23'455'-PentaCB-(120)	ng	ND	0.055	
23'45'6-PentaCB-(121)	ng	ND	0.062	
233'4'5'-PentaCB-(122)	ng	ND	0.047	
23'44'5'-PentaCB-(123)	ng	ND	0.056	
33'44'5-PentaCB-(126)	ng	ND	0.051	
33'455'-PentaCB-(127)	ng	ND	0.043	
HexaCB-(128)+(166)	ng	ND	0.11	
HexaCB-(129)+(138)+(163)	ng	ND	0.12	
22'33'45'-HexaCB-(130)	ng	ND	0.14	
22'33'46-HexaCB-(131)	ng	ND	0.14	
22'33'46'-HexaCB-(132)	ng	ND	0.14	
22'33'55'-HexaCB-(133)	ng	ND	0.12	
HexaCB-(134)+(143)	ng	ND	0.14	
HexaCB-(135)+(151)	ng	ND	0.067	

22'33'66'-HexaCB-(136)	ng	ND	0.047	
22'344'5-HexaCB-(137)	ng	ND	0.13	PCB RUN 1
HexaCB-(139)+(140)	ng	ND	0.11	
22'3455'-HexaCB-(141)	ng	ND	0.12	
22'3456-HexaCB-(142)	ng	ND	0.14	
22'345'6-HexaCB-(144)	ng	ND	0.063	
22'3466'-HexaCB-(145)	ng	ND	0.052	
22'34'55'-HexaCB-(146)	ng	ND	0.11	
HexaCB-(147)+(149)	ng	ND	0.11	
22'34'56'-HexaCB-(148)	ng	ND	0.064	
22'34'66'-HexaCB-(150)	ng	ND	0.049	
22'3566'-HexaCB-(152)	ng	ND	0.045	
HexaCB-(153)+(168)	ng	ND	0.095	
22'44'56'-HexaCB-(154)	ng	ND	0.054	
22'44'66'-HexaCB-(155)	ng	ND	0.048	
HexaCB-(156)+(157)	ng	ND	0.018	
233'44'6-HexaCB-(158)	ng	ND	0.081	
233'455'-HexaCB-(159)	ng	ND	0.017	
233'456-HexaCB-(160)	ng	ND	0.099	
233'45'6-HexaCB-(161)	ng	ND	0.089	
233'4'55'-HexaCB-(162)	ng	ND	0.017	
233'4'5'6-HexaCB-(164)	ng	ND	0.087	
233'55'6-HexaCB-(165)	ng	ND	0.10	
23'44'55'-HexaCB-(167)	ng	ND	0.019	
33'44'55'-HexaCB-(169)	ng	ND	0.020	
22'33'44'5-HeptaCB-(170)	ng	ND	0.027	
HeptaCB-(171)+(173)	ng	ND	0.041	
22'33'455'-HeptaCB-(172)	ng	ND	0.042	
22'33'456'-HeptaCB-(174)	ng	ND	0.039	
22'33'45'6-HeptaCB-(175)	ng	ND	0.019	
22'33'466'-HeptaCB-(176)	ng	ND	0.014	
22'33'45'6'-HeptaCB-(177)	ng	ND	0.041	
22'33'55'6-HeptaCB-(178)	ng	ND	0.020	
22'33'566'-HeptaCB-(179)	ng	ND	0.013	
HeptaCB-(180)+(193)	ng	ND	0.026	
22'344'56-HeptaCB-(181)	ng	ND	0.041	
22'344'56'-HeptaCB-(182)	ng	ND	0.019	
22'344'5'6-HeptaCB-(183)	ng	ND	0.034	
22'344'66'-HeptaCB-(184)	ng	ND	0.014	
22'3455'6-HeptaCB-(185)	ng	ND	0.042	
22'34566'-HeptaCB-(186)	ng	ND	0.015	
22'34'55'6-HeptaCB-(187)	ng	ND	0.019	
22'34'566'-HeptaCB-(188)	ng	ND	0.015	
233'44'55'-HeptaCB-(189)	ng	ND	0.017	
233'44'56-HeptaCB-(190)	ng	ND	0.030	
233'44'5'6-HeptaCB-(191)	ng	ND	0.029	
233'455'6-HeptaCB-(192)	ng	ND	0.034	
22'33'44'55'-OctaCB-(194)	ng	ND	0.015	
22'33'44'56-OctaCB-(195)	ng	ND	0.016	
22'33'44'56'-OctaCB-(196)	ng	ND	0.025	
22'33'44'66'OctaCB-(197)	ng	ND	0.020	
OctaCB-(198)+(199)	ng	ND	0.026	
22'33'4566'-OctaCB-(200)	ng	ND	0.017	

22'33'45'66'-OctaCB-(201)	ng	ND	0.018	
22'33'55'66'-OctaCB-(202)	ng	ND	0.021	PCB RUN 1
22'344'55'6-OctaCB-(203)	ng	ND	0.025	
22'344'566'-OctaCB-(204)	ng	ND	0.018	
233'44'55'6-OctaCB-(205)	ng	ND	0.012	
22'33'44'55'6-NonaCB-(206)	ng	ND	0.026	
22'33'44'566'-NonaCB-(207)	ng	ND	0.020	
22'33'455'66'-NonaCB-(208)	ng	ND	0.024	
DecaCB-(209)	ng	ND	0.026	
Monochlorobiphenyl	ng	15.2	0.18	
Dichlorobiphenyl	ng	37.7	0.14	
Trichlorobiphenyl	ng	25.9	0.076	
Tetrachlorobiphenyl	ng	4.81	0.14	
Pentachlorobiphenyl	ng	0.392	0.094	
Hexachlorobiphenyl	ng	ND	0.14	
Heptachlorobiphenyl	ng	ND	0.042	
Octachlorobiphenyl	ng	ND	0.026	
Nonachlorobiphenyl	ng	ND	0.026	
Decachlorobiphenyl	ng	ND	0.026	
Total PCB's	ng	167.248		
	ng/dscm	60.553		
	ng/dscm @ 7% O2	177.570		
DATA:				
Volume standard (DSCF)	97.53			
Oxygen (%)	16.16			

PCB EMISSION CALCULATION SHEET

PLANT:	**L&RR LANDFILL**	**RUN #:**	**2**
LOCATION:	**FLARE STACK**	**DATE :**	**02-Dec-14**

Maxxam ID		YT2089	
Sampling Date		12/2/2014	
	Units	**M23-2**	**EDL**
2-MonoCB-(1)	ng	9	0.16
3-MonoCB-(2)	ng	3.23	0.15
4-MonoCB-(3)	ng	2.24	0.16
22'-DiCB-(4)	ng	13.4	0.39
2,3-DiCB-(5)	ng		0.24
2,3'-DiCB-(6)	ng	1.72	0.20
2,4-DiCB-(7)	ng	0.32	0.21
2,4'-DiCB-(8)	ng	8.03	0.19
2,5-DiCB-(9)	ng	1.51	0.20
2,6-DiCB-(10)	ng		0.34
3,3'-DiCB-(11)	ng	0.96	0.21
DiCB-(12)+(13)	ng	0.34	0.21
3,5-DiCB-(14)	ng		0.20
4,4'-DiCB-(15)	ng	1.17	0.31
22'3-TriCB-(16)	ng	2.15	0.46
22'4-TriCB-(17)	ng	2.5	0.38
TriCB-(18)+(30)	ng	5.56	0.32
22'6-TriCB-(19)	ng	1.46	0.34
TriCB-(20) + (28)	ng	2.53	0.090
TriCB-(21)+(33)	ng	1.62	0.091
234'-TriCB-(22)	ng	0.797	0.098
235-TriCB-(23)	ng		0.10
236-TriCB-(24)	ng		0.30
23'4-TriCB-(25)	ng	0.226	0.084
TriCB-(26)+(29)	ng	0.589	0.091
23'6-TriCB-(27)	ng	0.31	0.26
24'5-TriCB-(31)	ng	2.49	0.084
24'6-TriCB-(32)	ng	1.2	0.24
23'5'-TriCB-(34)	ng		0.089
33'4-TriCB-(35)	ng		0.089
33'5-TriCB-(36)	ng		0.079
344'-TriCB-(37)	ng		0.14
345-TriCB-(38)	ng		0.093
34'5-TriCB-(39)	ng		0.090
TetraCB-(40)+(41)+(71)	ng	0.3	0.21
22'34'-TetraCB-(42)	ng		0.25
22'35-TetraCB-(43)	ng		0.28
TetraCB-(44)+(47)+(65)	ng	0.66	0.19
TetraCB-(45)+(51)	ng	0.39	0.21
22'36'-TetraCB-(46)	ng		0.25
22'45-TetraCB-(48)	ng		0.22
TetraCB-(49)+TetraCB-(69)	ng	0.43	0.18
TetraCB-(50)+(53)	ng	0.31	0.20
22'55'-TetraCB-(52)	ng	0.74	0.18
22'66'-TetraCB-(54)	ng		0.31
233'4-TetraCB-(55)	ng		0.13

233'4'-Tetra CB(56)	ng		0.12	
233'5-TetraCB-(57)	ng		0.11	PCB RUN 2
233'5'-TetraCB-(58)	ng		0.12	
TetraCB-(59)+(62)+(75)	ng		0.15	
2344'-TetraCB -(60)	ng		0.12	
TetraCB-(61)+(70)+(74)+(76)	ng	0.25	0.11	
234'5-TetraCB-(63)	ng		0.11	
234'6-TetraCB-(64)	ng	0.21	0.17	
23'44'-TetraCB-(66)	ng		0.10	
23'45-TetraCB-(67)	ng		0.098	
23'45'-TetraCB-(68)	ng		0.11	
23'55'-TetraCB-(72)	ng		0.11	
23'5'6-TetraCB-(73)	ng		0.18	
33'44'-TetraCB-(77)	ng		0.13	
33'45-TetraCB-(78)	ng		0.11	
33'45'-TetraCB(79)	ng		0.096	
33'55'-TetraCB-(80)	ng		0.098	
344'5-TetraCB-(81)	ng		0.13	
22'33'4-PentaCB-(82)	ng		0.17	
PentaCB-(83)+(99)	ng		0.15	
22'33'6-PentaCB-(84)	ng		0.17	
PentaCB-(85)+(116)+(117)	ng		0.12	
PentaCB-(86)(87)(97)(109)(119)(125)	ng		0.13	
PentaCB-(88)+(91)	ng		0.15	
22'346'-PentaCB-(89)	ng		0.16	
PentaCB-(90)+(101)+(113)	ng		0.13	
22'355'-PentaCB-(92)	ng		0.15	
PentaCB-(93)+(98)+(100)+(102)	ng		0.15	
22'356'-PentaCB-(94)	ng		0.17	
22'35'6-PentaCB-(95)	ng	0.15	0.14	
22'366'-PentaCB-(96)	ng		0.14	
22'45'6-PentaCB-(103)	ng		0.13	
22'466'-PentaCB-(104)	ng		0.13	
233'44'-PentaCB-(105)	ng		0.093	
233'45-PentaCB-(106)	ng		0.081	
233'4'5-PentaCB-(107)	ng		0.072	
PentaCB-(108)+(124)	ng		0.082	
PentaCB-(110)+(115)	ng		0.12	
233'55'-PentaCB-(111)	ng		0.11	
233'56-PentaCB-(112)	ng		0.11	
2344'5-PentaCB-(114)	ng		0.089	
23'44'5-PentaCB-(118)	ng		0.091	
23'455'-PentaCB-(120)	ng		0.10	
23'45'6-PentaCB-(121)	ng		0.12	
233'4'5'-PentaCB-(122)	ng		0.086	
23'44'5'-PentaCB-(123)	ng		0.10	
33'44'5-PentaCB-(126)	ng		0.091	
33'455'-PentaCB-(127)	ng		0.077	
HexaCB-(128)+(166)	ng		0.20	
HexaCB-(129)+(138)+(163)	ng		0.22	
22'33'45'-HexaCB-(130)	ng		0.27	
22'33'46-HexaCB-(131)	ng		0.28	
22'33'46'-HexaCB-(132)	ng		0.27	
22'33'55'-HexaCB-(133)	ng		0.24	
HexaCB-(134)+(143)	ng		0.27	
HexaCB-(135)+(151)	ng		0.26	

22'33'66'-HexaCB-(136)	ng		0.18	
22'344'5-HexaCB-(137)	ng		0.27	PCB RUN 2
HexaCB-(139)+(140)	ng		0.22	
22'3455'-HexaCB-(141)	ng		0.25	
22'3456-HexaCB-(142)	ng		0.26	
22'345'6-HexaCB-(144)	ng		0.25	
22'3466'-HexaCB-(145)	ng		0.20	
22'34'55'-HexaCB-(146)	ng		0.21	
HexaCB-(147)+(149)	ng		0.23	
22'34'56'-HexaCB-(148)	ng		0.25	
22'34'66'-HexaCB-(150)	ng		0.18	
22'3566'-HexaCB-(152)	ng		0.18	
HexaCB-(153)+(168)	ng		0.18	
22'44'56'-HexaCB-(154)	ng		0.22	
22'44'66'-HexaCB-(155)	ng		0.17	
HexaCB-(156)+(157)	ng		0.13	
233'44'6-HexaCB-(158)	ng		0.16	
233'455'-HexaCB-(159)	ng		0.11	
233'456-HexaCB-(160)	ng		0.19	
233'45'6-HexaCB-(161)	ng		0.17	
233'4'55'-HexaCB-(162)	ng		0.12	
233'4'5'6-HexaCB-(164)	ng		0.16	
233'55'6-HexaCB-(165)	ng		0.20	
23'44'55'-HexaCB-(167)	ng		0.14	
33'44'55'-HexaCB-(169)	ng		0.14	
22'33'44'5-HeptaCB-(170)	ng		0.21	
HeptaCB-(171)+(173)	ng		0.31	
22'33'455'-HeptaCB-(172)	ng		0.32	
22'33'456'-HeptaCB-(174)	ng		0.29	
22'33'45'6-HeptaCB-(175)	ng		0.24	
22'33'466'-HeptaCB-(176)	ng		0.18	
22'33'45'6'-HeptaCB-(177)	ng		0.31	
22'33'55'6-HeptaCB-(178)	ng		0.25	
22'33'566'-HeptaCB-(179)	ng		0.17	
HeptaCB-(180)+(193)	ng		0.19	
22'344'56-HeptaCB-(181)	ng		0.31	
22'344'56'-HeptaCB-(182)	ng		0.23	
22'344'5'6-HeptaCB-(183)	ng		0.27	
22'344'66'-HeptaCB-(184)	ng		0.18	
22'3455'6-HeptaCB-(185)	ng		0.32	
22'34566'-HeptaCB-(186)	ng		0.19	
22'34'55'6-HeptaCB-(187)	ng		0.24	
22'34'566'-HeptaCB-(188)	ng		0.19	
233'44'55'-HeptaCB-(189)	ng		0.15	
233'44'56-HeptaCB-(190)	ng		0.23	
233'44'5'6-HeptaCB-(191)	ng		0.22	
233'455'6-HeptaCB-(192)	ng		0.26	
22'33'44'55'-OctaCB-(194)	ng		0.22	
22'33'44'56-OctaCB-(195)	ng		0.24	
22'33'44'56'-OctaCB-(196)	ng		0.28	
22'33'44'66'OctaCB-(197)	ng		0.23	
OctaCB-(198)+(199)	ng		0.29	
22'33'4566'-OctaCB-(200)	ng		0.19	
22'33'45'66'-OctaCB-(201)	ng		0.20	
22'33'55'66'-OctaCB-(202)	ng		0.23	
22'344'55'6-OctaCB-(203)	ng		0.27	

22'344'566'-OctaCB-(204)	ng		0.20	
233'44'55'6-OctaCB-(205)	ng		0.19	PCB RUN 2
22'33'44'55'6-NonaCB-(206)	ng		0.39	
22'33'44'566'-NonaCB-(207)	ng		0.30	
22'33'455'66'-NonaCB-(208)	ng		0.36	
DecaCB-(209)	ng		0.49	
Monochlorobiphenyl	ng	13.5	0.16	
Dichlorobiphenyl	ng	27.5	0.39	
Trichlorobiphenyl	ng	21.4	0.46	
Tetrachlorobiphenyl	ng	3.29	0.31	
Pentachlorobiphenyl	ng		0.17	
Hexachlorobiphenyl	ng		0.28	
Heptachlorobiphenyl	ng		0.32	
Octachlorobiphenyl	ng		0.29	
Nonachlorobiphenyl	ng		0.39	
Decachlorobiphenyl	ng		0.49	
Total PCB's	ng	132.482		
	ng/dscm	47.293		
	ng/dscm @ 7% O2	138.978		
DATA:				
Volume standard (DSCF)	98.92			
Oxygen (%)	16.17			

PCB EMISSION CALCULATION SHEET

PLANT:	**L&RR LANDFILL**	**RUN #:**	**3**
LOCATION:	**FLARE STACK**	**DATE :**	**03-Dec-14**

Maxxam ID		YT2089	
Sampling Date		12/3/2014	
	Units	**M23-3**	**EDL**
2-MonoCB-(1)	ng	159	0.18
3-MonoCB-(2)	ng	351	0.17
4-MonoCB-(3)	ng	218	0.17
22'-DiCB-(4)	ng	16.8	0.41
2,3-DiCB-(5)	ng	2.58	0.18
2,3'-DiCB-(6)	ng	4.61	0.16
2,4-DiCB-(7)	ng	3.03	0.17
2,4'-DiCB-(8)	ng	12.7	0.15
2,5-DiCB-(9)	ng	3.68	0.16
2,6-DiCB-(10)	ng	0.52	0.35
3,3'-DiCB-(11)	ng	8.15	0.16
DiCB-(12)+(13)	ng	35.9	0.17
3,5-DiCB-(14)	ng	4.42	0.16
4,4'-DiCB-(15)	ng	4.29	0.25
22'3-TriCB-(16)	ng	3.00	0.43
22'4-TriCB-(17)	ng	3.83	0.35
TriCB-(18)+(30)	ng	8.26	0.29
22'6-TriCB-(19)	ng	1.92	0.31
TriCB-(20) + (28)	ng	4.17	0.084
TriCB-(21)+(33)	ng	3.25	0.085
234'-TriCB-(22)	ng	1.33	0.092
235-TriCB-(23)	ng	0.241	0.096
236-TriCB-(24)	ng	ND	0.28
23'4-TriCB-(25)	ng	0.487	0.078
TriCB-(26)+(29)	ng	1.31	0.085
23'6-TriCB-(27)	ng	0.46	0.24
24'5-TriCB-(31)	ng	3.85	0.078
24'6-TriCB-(32)	ng	1.69	0.23
23'5'-TriCB-(34)	ng	0.092	0.083
33'4-TriCB-(35)	ng	1.26	0.083
33'5-TriCB-(36)	ng	0.259	0.074
344'-TriCB-(37)	ng	1.13	0.13
345-TriCB-(38)	ng	1.26	0.087
34'5-TriCB-(39)	ng	0.211	0.084
TetraCB-(40)+(41)+(71)	ng	0.51	0.36
22'34'-TetraCB-(42)	ng	ND	0.43
22'35-TetraCB-(43)	ng	ND	0.49
TetraCB-(44)+(47)+(65)	ng	1.28	0.33
TetraCB-(45)+(51)	ng	0.66	0.37
22'36'-TetraCB-(46)	ng	ND	0.43
22'45-TetraCB-(48)	ng	ND	0.37
TetraCB-(49)+TetraCB-(69)	ng	0.70	0.31
TetraCB-(50)+(53)	ng	0.46	0.35
22'55'-TetraCB-(52)	ng	1.28	0.30
22'66'-TetraCB-(54)	ng	ND	0.32
233'4-TetraCB-(55)	ng	ND	0.14

233'4'-Tetra CB(56)	ng	0.18	0.13	
233'5-TetraCB-(57)	ng	ND	0.12	PCB RUN 3
233'5'-TetraCB-(58)	ng	ND	0.13	
TetraCB-(59)+(62)+(75)	ng	ND	0.26	
2344'-TetraCB -(60)	ng	ND	0.13	
TetraCB-(61)+(70)+(74)+(76)	ng	0.66	0.12	
234'5-TetraCB-(63)	ng	ND	0.11	
234'6-TetraCB-(64)	ng	0.35	0.28	
23'44'-TetraCB-(66)	ng	0.21	0.11	
23'45-TetraCB-(67)	ng	ND	0.10	
23'45'-TetraCB-(68)	ng	ND	0.12	
23'55'-TetraCB-(72)	ng	ND	0.12	
23'5'6-TetraCB-(73)	ng	ND	0.30	
33'44'-TetraCB-(77)	ng	0.25	0.14	
33'45-TetraCB-(78)	ng	ND	0.12	
33'45'-TetraCB(79)	ng	ND	0.10	
33'55'-TetraCB-(80)	ng	ND	0.11	
344'5-TetraCB-(81)	ng	ND	0.14	
22'33'4-PentaCB-(82)	ng	ND	0.18	
PentaCB-(83)+(99)	ng	ND	0.16	
22'33'6-PentaCB-(84)	ng	ND	0.18	
PentaCB-(85)+(116)+(117)	ng	ND	0.13	
PentaCB-(86)(87)(97)(109)(119)(125)	ng	0.19	0.13	
PentaCB-(88)+(91)	ng	ND	0.16	
22'346'-PentaCB-(89)	ng	ND	0.17	
PentaCB-(90)+(101)+(113)	ng	0.25	0.13	
22'355'-PentaCB-(92)	ng	ND	0.16	
PentaCB-(93)+(98)+(100)+(102)	ng	ND	0.16	
22'356'-PentaCB-(94)	ng	ND	0.18	
22'35'6-PentaCB-(95)	ng	0.29	0.14	
22'366'-PentaCB-(96)	ng	ND	0.17	
22'45'6-PentaCB-(103)	ng	ND	0.13	
22'466'-PentaCB-(104)	ng	ND	0.15	
233'44'-PentaCB-(105)	ng	ND	0.095	
233'45-PentaCB-(106)	ng	ND	0.083	
233'4'5-PentaCB-(107)	ng	ND	0.074	
PentaCB-(108)+(124)	ng	ND	0.084	
PentaCB-(110)+(115)	ng	0.23	0.12	
233'55'-PentaCB-(111)	ng	ND	0.12	
233'56-PentaCB-(112)	ng	ND	0.12	
2344'5-PentaCB-(114)	ng	ND	0.091	
23'44'5-PentaCB-(118)	ng	0.140	0.094	
23'455'-PentaCB-(120)	ng	ND	0.11	
23'45'6-PentaCB-(121)	ng	ND	0.12	
233'4'5'-PentaCB-(122)	ng	ND	0.088	
23'44'5'-PentaCB-(123)	ng	ND	0.10	
33'44'5-PentaCB-(126)	ng	ND	0.093	
33'455'-PentaCB-(127)	ng	ND	0.078	
HexaCB-(128)+(166)	ng	ND	0.17	
HexaCB-(129)+(138)+(163)	ng	ND	0.18	
22'33'45'-HexaCB-(130)	ng	ND	0.22	
22'33'46-HexaCB-(131)	ng	ND	0.24	
22'33'46'-HexaCB-(132)	ng	ND	0.23	
22'33'55'-HexaCB-(133)	ng	ND	0.20	
HexaCB-(134)+(143)	ng	ND	0.22	
HexaCB-(135)+(151)	ng	ND	0.22	

22'33'66'-HexaCB-(136)	ng	ND	0.16	
22'344'5-HexaCB-(137)	ng	ND	0.23	PCB RUN 3
HexaCB-(139)+(140)	ng	ND	0.19	
22'3455'-HexaCB-(141)	ng	ND	0.21	
22'3456-HexaCB-(142)	ng	ND	0.22	
22'345'6-HexaCB-(144)	ng	ND	0.21	
22'3466'-HexaCB-(145)	ng	ND	0.17	
22'34'55'-HexaCB-(146)	ng	ND	0.18	
HexaCB-(147)+(149)	ng	ND	0.19	
22'34'56'-HexaCB-(148)	ng	ND	0.21	
22'34'66'-HexaCB-(150)	ng	ND	0.16	
22'3566'-HexaCB-(152)	ng	ND	0.16	
HexaCB-(153)+(168)	ng	ND	0.15	
22'44'56'-HexaCB-(154)	ng	ND	0.18	
22'44'66'-HexaCB-(155)	ng	ND	0.15	
HexaCB-(156)+(157)	ng	ND	0.11	
233'44'6-HexaCB-(158)	ng	ND	0.13	
233'455'-HexaCB-(159)	ng	ND	0.097	
233'456-HexaCB-(160)	ng	ND	0.16	
233'45'6-HexaCB-(161)	ng	ND	0.14	
233'4'55'-HexaCB-(162)	ng	ND	0.10	
233'4'5'6-HexaCB-(164)	ng	ND	0.13	
233'55'6-HexaCB-(165)	ng	ND	0.17	
23'44'55'-HexaCB-(167)	ng	ND	0.12	
33'44'55'-HexaCB-(169)	ng	ND	0.12	
22'33'44'5-HeptaCB-(170)	ng	ND	0.15	
HeptaCB-(171)+(173)	ng	ND	0.23	
22'33'455'-HeptaCB-(172)	ng	ND	0.23	
22'33'456'-HeptaCB-(174)	ng	ND	0.21	
22'33'45'6-HeptaCB-(175)	ng	ND	0.21	
22'33'466'-HeptaCB-(176)	ng	ND	0.15	
22'33'45'6'-HeptaCB-(177)	ng	ND	0.23	
22'33'55'6-HeptaCB-(178)	ng	ND	0.22	
22'33'566'-HeptaCB-(179)	ng	ND	0.15	
HeptaCB-(180)+(193)	ng	ND	0.14	
22'344'56-HeptaCB-(181)	ng	ND	0.23	
22'344'56'-HeptaCB-(182)	ng	ND	0.20	
22'344'5'6-HeptaCB-(183)	ng	ND	0.20	
22'344'66'-HeptaCB-(184)	ng	ND	0.16	
22'3455'6-HeptaCB-(185)	ng	ND	0.23	
22'34566'-HeptaCB-(186)	ng	ND	0.17	
22'34'55'6-HeptaCB-(187)	ng	ND	0.21	
22'34'566'-HeptaCB-(188)	ng	ND	0.17	
233'44'55'-HeptaCB-(189)	ng	ND	0.16	
233'44'56-HeptaCB-(190)	ng	ND	0.17	
233'44'5'6-HeptaCB-(191)	ng	ND	0.16	
233'455'6-HeptaCB-(192)	ng	ND	0.19	
22'33'44'55'-OctaCB-(194)	ng	ND	0.26	
22'33'44'56-OctaCB-(195)	ng	ND	0.29	
22'33'44'56'-OctaCB-(196)	ng	ND	0.36	
22'33'44'66'OctaCB-(197)	ng	ND	0.29	
OctaCB-(198)+(199)	ng	ND	0.37	
22'33'4566'-OctaCB-(200)	ng	ND	0.24	
22'33'45'66'-OctaCB-(201)	ng	ND	0.25	
22'33'55'66'-OctaCB-(202)	ng	ND	0.30	
22'344'55'6-OctaCB-(203)	ng	ND	0.35	

22'344'566'-OctaCB-(204)	ng	ND	0.26	
233'44'55'6-OctaCB-(205)	ng	ND	0.23	PCB RUN 3
22'33'44'55'6-NonaCB-(206)	ng	ND	0.42	
22'33'44'566'-NonaCB-(207)	ng	ND	0.32	
22'33'455'66'-NonaCB-(208)	ng	ND	0.38	
DecaCB-(209)	ng	ND	0.45	
Monochlorobiphenyl	ng	729	0.18	
Dichlorobiphenyl	ng	96.6	0.41	
Trichlorobiphenyl	ng	38.0	0.43	
Tetrachlorobiphenyl	ng	6.53	0.49	
Pentachlorobiphenyl	ng	1.10	0.18	
Hexachlorobiphenyl	ng	ND	0.24	
Heptachlorobiphenyl	ng	ND	0.23	
Octachlorobiphenyl	ng	ND	0.37	
Nonachlorobiphenyl	ng	ND	0.42	
Decachlorobiphenyl	ng	ND	0.45	
Total PCB's	ng	1741.560		
	ng/dscm	568.221		
	ng/dscm @ 7% O2	1702.214		
DATA:				
Volume standard (DSCF)	108.23			
Oxygen (%)	16.26			

Appendix E

TO-15 EMISSION CALCULATION SHEET IN AIR

PLANT:	L&RR LANDFILL	**RUN #:**	1
LOCATION:	FLARE STACK	**DATE :**	03-DEC-14

VOLATILE ORGANICS BY GC/MS (AIR)

Maxxam ID		YT1481		YT1482		
Sampling TIME		9:00-10:40		9:00-10:40		
COC Number		065734		065734		
	Units	**L&RR TO-15-1 INLET**	**DL**	**L&RR TO-15-1 OUTLET**	**DL**	**DE %**
Dichlorodifluoromethane (FREON 12)	ug/m3	593	188	17.8	17.8	97
1,2-Dichlorotetrafluoroethane	ug/m3	846	226	22.0	21.4	97
Chloromethane	ug/m3	129	118	15.7	11.2	88
Vinyl Chloride	ug/m3	2240	87.4	45.1	8.28	98
Chloroethane	ug/m3	314	150	14.2	14.2	95
1,3-Butadiene	ug/m3	<210	210	52.8	19.9	ND
Trichlorofluoromethane (FREON 11)	ug/m3	<213	213	<20.2	20.2	ND
Ethanol (ethyl alcohol)	ug/m3	<1090	1090	<78.0	78.0	ND
Trichlorotrifluoroethane	ug/m3	<218	218	<20.7	20.7	ND
2-propanol	ug/m3	<1400	1400	<133	133	ND
Acetone (2-Propanone)	ug/m3	<1850	1850	4360	34.2	0
Methyl Ethyl Ketone (2-Butanone)	ug/m3	<1680	1680	<159	159	ND
Methyl Isobutyl Ketone	ug/m3	<2490	2490	<236	236	ND
Methyl Butyl Ketone (2-Hexanone)	ug/m3	<1560	1560	<147	147	ND
Methyl t-butyl ether (MTBE)	ug/m3	<137	137	<13.0	13.0	ND
Ethyl Acetate	ug/m3	<1510	1510	<143	143	ND
1,1-Dichloroethylene	ug/m3	<188	188	<17.8	17.8	ND
cis-1,2-Dichloroethylene	ug/m3	2190	143	35.4	13.6	98
trans-1,2-Dichloroethylene	ug/m3	<151	151	<14.3	14.3	ND
Methylene Chloride(Dichloromethane)	ug/m3	<2010	2010	<86.8	86.8	ND
Chloroform	ug/m3	<139	139	17.3	13.2	0
Carbon Tetrachloride	ug/m3	<359	359	<34.0	34.0	ND
1,1-Dichloroethane	ug/m3	717	154	14.6	14.6	98
1,2-Dichloroethane	ug/m3	<154	154	<14.6	14.6	ND
Ethylene Dibromide	ug/m3	<248	248	<23.5	23.5	ND
1,1,1-Trichloroethane	ug/m3	<311	311	<29.5	29.5	ND
1,1,2-Trichloroethane	ug/m3	<155	155	<14.7	14.7	ND
1,1,2,2-Tetrachloroethane	ug/m3	<261	261	<24.7	24.7	ND
cis-1,3-Dichloropropene	ug/m3	<155	155	<14.7	14.7	ND
trans-1,3-Dichloropropene	ug/m3	<147	147	<13.9	13.9	ND
1,2-Dichloropropane	ug/m3	<351	351	<33.3	33.3	ND
Bromomethane	ug/m3	<133	133	<12.6	12.6	ND
Bromoform	ug/m3	<393	393	<37.2	37.2	ND
Bromodichloromethane	ug/m3	<255	255	<24.1	24.1	ND
Dibromochloromethane	ug/m3	<324	324	<30.7	30.7	ND
Trichloroethylene	ug/m3	374	306	29	29.0	92
Tetrachloroethylene	ug/m3	632	258	24.4	24.4	96
Benzene	ug/m3	7840	109	329	10.4	96
Toluene	ug/m3	133000	286	5900	13.5	96
Ethylbenzene	ug/m3	33900	165	380	15.6	99
p+m-Xylene	ug/m3	58300	305	466	28.9	99
o-Xylene	ug/m3	14100	165	114	15.6	99
Styrene	ug/m3	441	162	22.2	15.3	95
4-ethyltoluene	ug/m3	<2050	2050	<195	195	ND
1,3,5-Trimethylbenzene	ug/m3	2580	467	44.2	44.2	98
1,2,4-Trimethylbenzene	ug/m3	4910	467	44.2	44.2	99
Chlorobenzene	ug/m3	1210	175	24.5	16.6	98
Benzyl chloride	ug/m3	<984	984	<93.2	93.2	ND
1,3-Dichlorobenzene	ug/m3	<457	457	<43.3	43.3	ND
1,4-Dichlorobenzene	ug/m3	1080	457	43.3	43.3	96
1,2-Dichlorobenzene	ug/m3	<457	457	<43.3	43.3	ND
1,2,4-Trichlorobenzene	ug/m3	<2820	2820	<267	267	ND
Hexachlorobutadiene	ug/m3	<6080	6080	<576	576	ND
Hexane	ug/m3	8830	201	188	19.0	98
Heptane	ug/m3	4980	234	59.3	22.1	99
Cyclohexane	ug/m3	3610	131	49.6	12.4	99
Tetrahydrofuran	ug/m3	<224	224	<21.2	21.2	ND
1,4-Dioxane	ug/m3	<1370	1370	<130	130	ND
Total Xylenes	ug/m3	72300	495	580	46.9	99
Vinyl Bromide	ug/m3	<166	166	<15.7	15.7	ND
Propene	ug/m3	8160	98.1	749	9.29	91
2,2,4-Trimethylpentane	ug/m3	490	178	16.8	16.8	97
Carbon Disulfide	ug/m3	<296	296	<28.0	28.0	ND
Vinyl Acetate	ug/m3	<134	134	<12.7	12.7	ND

TO-15 EMISSION CALCULATION SHEET IN AIR

PLANT:	L&RR LANDFILL	**RUN #:**	2
LOCATION:	FLARE STACK	**DATE :**	03-DEC-14

VOLATILE ORGANICS BY GC/MS (AIR)

Maxxam ID		YT1481		YT1482		
Sampling TIME		10:45-12:20		10:45-12:20		
COC Number		065734		065734		
	Units	**L&RR TO-15-2 INLET**	**DL**	**L&RR TO-15-2 OUTLET**	**DL**	**DE %**
Dichlorodifluoromethane (FREON 12)	ug/m3	595	178	18.8	18.8	97
1,2-Dichlorotetrafluoroethane	ug/m3	850	214	22.9	22.6	97
Chloromethane	ug/m3	<112	112	12.7	11.8	N/A
Vinyl Chloride	ug/m3	2280	82.8	51.3	8.74	98
Chloroethane	ug/m3	295	142	15	15.0	95
1,3-Butadiene	ug/m3	<199	199	44.7	21.0	N/A
Trichlorofluoromethane (FREON 11)	ug/m3	<202	202	<21.3	21.3	ND
Ethanol (ethyl alcohol)	ug/m3	<780	780	<98.0	98.0	ND
Trichlorotrifluoroethane	ug/m3	<207	207	<21.8	21.8	ND
2-propanol	ug/m3	<1330	1330	<140	140	ND
Acetone (2-Propanone)	ug/m3	<1190	1190	817	36.1	N/A
Methyl Ethyl Ketone (2-Butanone)	ug/m3	<1590	1590	<168	168	ND
Methyl Isobutyl Ketone	ug/m3	<2360	2360	<249	249	ND
Methyl Butyl Ketone (2-Hexanone)	ug/m3	<1470	1470	<156	156	ND
Methyl t-butyl ether (MTBE)	ug/m3	<130	130	<13.7	13.7	ND
Ethyl Acetate	ug/m3	<1430	1430	<151	151	ND
1,1-Dichloroethylene	ug/m3	<178	178	<18.8	18.8	ND
cis-1,2-Dichloroethylene	ug/m3	2120	136	39.0	14.3	98
trans-1,2-Dichloroethylene	ug/m3	<143	143	<15.1	15.1	ND
Methylene Chloride(Dichloromethane)	ug/m3	<1110	1110	<122	122	ND
Chloroform	ug/m3	<132	132	19.2	13.9	N/A
Carbon Tetrachloride	ug/m3	<340	340	<35.9	35.9	ND
1,1-Dichloroethane	ug/m3	772	146	15.4	15.4	98
1,2-Dichloroethane	ug/m3	<146	146	<15.4	15.4	ND
Ethylene Dibromide	ug/m3	<235	235	<24.8	24.8	ND
1,1,1-Trichloroethane	ug/m3	<295	295	<31.1	31.1	ND
1,1,2-Trichloroethane	ug/m3	<147	147	<15.5	15.5	ND
1,1,2,2-Tetrachloroethane	ug/m3	<247	247	<26.1	26.1	ND
cis-1,3-Dichloropropene	ug/m3	<147	147	<15.5	15.5	ND
trans-1,3-Dichloropropene	ug/m3	<139	139	<14.7	14.7	ND
1,2-Dichloropropane	ug/m3	<333	333	<35.1	35.1	ND
Bromomethane	ug/m3	<126	126	<13.3	13.3	ND
Bromoform	ug/m3	<372	372	<39.3	39.3	ND
Bromodichloromethane	ug/m3	<241	241	<25.5	25.5	ND
Dibromochloromethane	ug/m3	<307	307	<32.4	32.4	ND
Trichloroethylene	ug/m3	422	290	30.6	30.6	93
Tetrachloroethylene	ug/m3	622	244	25.8	25.8	96
Benzene	ug/m3	7450	104	361	10.9	95
Toluene	ug/m3	103000	271	5360	14.3	95
Ethylbenzene	ug/m3	33000	156	257	16.5	99
p+m-Xylene	ug/m3	57100	289	284	30.5	100
o-Xylene	ug/m3	13700	156	76.9	16.5	99
Styrene	ug/m3	405	153	17.3	16.2	96
4-ethyltoluene	ug/m3	1980	1950	205	205	90
1,3,5-Trimethylbenzene	ug/m3	2530	442	46.7	46.7	98
1,2,4-Trimethylbenzene	ug/m3	4820	442	46.7	46.7	99
Chlorobenzene	ug/m3	1220	166	27.8	17.5	98
Benzyl chloride	ug/m3	<932	932	<98.4	98.4	ND
1,3-Dichlorobenzene	ug/m3	<433	433	<45.7	45.7	ND
1,4-Dichlorobenzene	ug/m3	1060	433	45.7	45.7	96
1,2-Dichlorobenzene	ug/m3	<433	433	<45.7	45.7	ND
1,2,4-Trichlorobenzene	ug/m3	<2670	2670	<282	282	ND
Hexachlorobutadiene	ug/m3	<5760	5760	<608	608	ND
Hexane	ug/m3	7140	190	233	20.1	97
Heptane	ug/m3	4680	221	60.9	23.4	99
Cyclohexane	ug/m3	3410	124	46.4	13.1	99
Tetrahydrofuran	ug/m3	<212	212	<22.4	22.4	ND
1,4-Dioxane	ug/m3	<1300	1300	<137	137	ND
Total Xylenes	ug/m3	70800	469	360	49.5	99
Vinyl Bromide	ug/m3	<157	157	<16.6	16.6	ND
Propene	ug/m3	7760	92.9	759	9.81	90
2,2,4-Trimethylpentane	ug/m3	366	168	17.8	17.8	95
Carbon Disulfide	ug/m3	<280	280	<29.6	29.6	ND
Vinyl Acetate	ug/m3	<127	127	<13.4	13.4	ND

TO-15 EMISSION CALCULATION SHEET IN AIR

PLANT:	L&RR LANDFILL	RUN #:	3
LOCATION:	FLARE STACK	DATE :	03-DEC-14

VOLATILE ORGANICS BY GC/MS (AIR)

Maxxam ID		YT1481		YT1482		
Sampling TIME		12:25-14:25		12:25-14:25		
COC Number		065734		065734		
	Units	**L&RR TO-15-3 INLET**	**DL**	**L&RR TO-15-3 OUTLET**	**DL**	**DE %**
Dichlorodifluoromethane (FREON 12)	ug/m3	683	188	17.0	0.989	98
1,2-Dichlorotetrafluoroethane	ug/m3	975	226	24.2	1.19	98
Chloromethane	ug/m3	<118	118	8.52	0.620	N/A
Vinyl Chloride	ug/m3	2730	87.4	60.7	0.460	98
Chloroethane	ug/m3	351	150	1.20	0.792	100
1,3-Butadiene	ug/m3	<210	210	38.8	1.11	N/A
Trichlorofluoromethane (FREON 11)	ug/m3	<213	213	1.24	1.12	N/A
Ethanol (ethyl alcohol)	ug/m3	<823	823	<4.33	4.33	ND
Trichlorotrifluoroethane	ug/m3	<218	218	1.22	1.15	N/A
2-propanol	ug/m3	<1400	1400	<7.37	7.37	ND
Acetone (2-Propanone)	ug/m3	<998	998	103	1.90	N/A
Methyl Ethyl Ketone (2-Butanone)	ug/m3	<1680	1680	<8.85	8.85	ND
Methyl Isobutyl Ketone	ug/m3	<2490	2490	<13.1	13.1	ND
Methyl Butyl Ketone (2-Hexanone)	ug/m3	<1560	1560	<8.19	8.19	ND
Methyl t-butyl ether (MTBE)	ug/m3	<137	137	<0.721	0.721	ND
Ethyl Acetate	ug/m3	<1510	1510	<7.93	7.93	ND
1,1-Dichloroethylene	ug/m3	<188	188	1.77	0.991	N/A
cis-1,2-Dichloroethylene	ug/m3	2670	143	52.8	0.753	98
trans-1,2-Dichloroethylene	ug/m3	<151	151	7.35	0.793	N/A
Methylene Chloride(Dichloromethane)	ug/m3	<1560	1560	12.3	2.78	N/A
Chloroform	ug/m3	<139	139	<0.732	0.732	ND
Carbon Tetrachloride	ug/m3	<359	359	<1.89	1.89	ND
1,1-Dichloroethane	ug/m3	933	154	0.809	0.809	100
1,2-Dichloroethane	ug/m3	<154	154	<0.809	0.809	ND
Ethylene Dibromide	ug/m3	<248	248	<1.31	1.31	ND
1,1,1-Trichloroethane	ug/m3	<311	311	<1.64	1.64	ND
1,1,2-Trichloroethane	ug/m3	<155	155	<0.818	0.818	ND
1,1,2,2-Tetrachloroethane	ug/m3	<261	261	<1.37	1.37	ND
cis-1,3-Dichloropropene	ug/m3	<155	155	<0.817	0.817	ND
trans-1,3-Dichloropropene	ug/m3	<147	147	<0.772	0.772	ND
1,2-Dichloropropane	ug/m3	<351	351	<1.85	1.85	ND
Bromomethane	ug/m3	<133	133	<0.699	0.699	ND
Bromoform	ug/m3	<393	393	<2.07	2.07	ND
Bromodichloromethane	ug/m3	<255	255	<1.34	1.34	ND
Dibromochloromethane	ug/m3	<324	324	<1.70	1.70	ND
Trichloroethylene	ug/m3	476	306	10.9	1.61	98
Tetrachloroethylene	ug/m3	748	258	20.1	1.36	97
Benzene	ug/m3	8940	109	523	3.16	94
Toluene	ug/m3	133000	286	2070	4.14	98
Ethylbenzene	ug/m3	41700	165	388	0.868	99
p+m-Xylene	ug/m3	72100	305	384	1.61	99
o-Xylene	ug/m3	17500	165	101	0.868	99
Styrene	ug/m3	514	162	36.6	0.852	93
4-ethyltoluene	ug/m3	2540	2050	10.8	10.8	100
1,3,5-Trimethylbenzene	ug/m3	3200	467	5.53	2.46	100
1,2,4-Trimethylbenzene	ug/m3	6260	467	3.42	2.46	100
Chlorobenzene	ug/m3	1590	175	46.9	0.921	97
Benzyl chloride	ug/m3	<984	984	<5.18	5.18	ND
1,3-Dichlorobenzene	ug/m3	<457	457	<2.40	2.40	ND
1,4-Dichlorobenzene	ug/m3	1430	457	63.4	2.40	96
1,2-Dichlorobenzene	ug/m3	<457	457	6.88	2.40	N/A
1,2,4-Trichlorobenzene	ug/m3	<2820	2820	<14.8	14.8	ND
Hexachlorobutadiene	ug/m3	<6080	6080	<32.0	32.0	ND
Hexane	ug/m3	9180	201	116	1.06	99
Heptane	ug/m3	5710	234	77.4	1.23	99
Cyclohexane	ug/m3	4150	131	51.3	0.688	99
Tetrahydrofuran	ug/m3	<224	224	<1.18	1.18	ND
1,4-Dioxane	ug/m3	<1370	1370	<7.21	7.21	ND
Total Xylenes	ug/m3	89600	495	485	2.61	99
Vinyl Bromide	ug/m3	<166	166	<0.875	0.875	ND
Propene	ug/m3	9300	98.1	1110	2.84	88
2,2,4-Trimethylpentane	ug/m3	480	178	6.89	0.934	99
Carbon Disulfide	ug/m3	<296	296	2.99	1.56	N/A
Vinyl Acetate	ug/m3	<134	134	<0.704	0.704	ND

TO-15 EMISSION CALCULATION SHEET IN WATER

PLANT:	**L&RR LANDFILL**	**RUN #:**	**1**
LOCATION:	**FLARE STACK**	**DATE :**	**03-DEC-14**

VOLATILE ORGANICS BY GC/MS (Water)

Maxxam ID		YT1481		YT1482				
Sampling TIME		9:00-10:40		9:00-10:40				
COC Number		065734		065734				
	Units	**L&RR TO-15-1 INLET**	**DL**	**L&RR TO-15-1 OUTLET**	**DL**	**INLET UG/M3**	**OUTLET UG/M3**	**DE %**
Dichlorodifluoromethane (FREON 12)	ug/L	<100	100	<2.5	2.5			ND
Chloromethane	ug/L	<200	200	<5.0	5.0			ND
Vinyl Chloride	ug/L	<40	40	<1.0	1.0			ND
Bromomethane	ug/L	<300	300	<7.5	7.5			ND
Chloroethane	ug/L	<100	100	<2.5	2.5			ND
Trichlorofluoromethane (FREON 11)	ug/L	<200	200	<5.0	5.0			ND
Acetone (2-Propanone)	ug/L	2400	1500	320	38	16000	2133	87
1,1-Dichloroethylene	ug/L	<50	50	<1.3	1.3			ND
Iodomethane	ug/L	<60	60	<1.5	1.5			ND
Carbon Disulfide	ug/L	<50	50	<1.3	1.3			ND
Methylene Chloride(Dichloromethane)	ug/L	<100	100	<2.5	2.5			ND
1,1-Dichloroethane	ug/L	<40	40	<1.0	1.0			ND
trans-1,2-Dichloroethylene	ug/L	<100	100	<2.5	2.5			ND
cis-1,2-Dichloroethylene	ug/L	<100	100	<2.5	2.5			ND
Chloroform	ug/L	<40	40	<1.0	1.0			ND
1,2-Dichloroethane	ug/L	<50	50	<1.3	1.3			ND
Methyl Ethyl Ketone (2-Butanone)	ug/L	1900	1000	25	25	12667	167	99
1,1,1-Trichloroethane	ug/L	<50	50	<1.3	1.3			ND
Carbon Tetrachloride	ug/L	<50	50	<1.3	1.3			ND
Benzene	ug/L	<50	50	<1.3	1.3			ND
1,1,2-Trichloroethane	ug/L	<50	50	<1.3	1.3			ND
1,2-Dichloropropane	ug/L	<50	50	<1.3	1.3			ND
Trichloroethylene	ug/L	<50	50	<1.3	1.3			ND
Dibromomethane	ug/L	<50	50	<1.3	1.3			ND
Bromodichloromethane	ug/L	<40	40	<1.0	1.0			ND
cis-1,3-Dichloropropene	ug/L	<40	40	<1.0	1.0			ND
trans-1,3-Dichloropropene	ug/L	<60	60	<1.5	1.5			ND
Dibromochloromethane	ug/L	<40	40	<1.0	1.0			ND
Methyl Isobutyl Ketone	ug/L	<1000	1000	<25	25			ND
Methyl Butyl Ketone (2-Hexanone)	ug/L	<1000	1000	<25	25			ND
Toluene	ug/L	480	50	1.3	1.3	3200	ND	100
Ethylene Dibromide	ug/L	<50	50	<1.3	1.3			ND
Tetrachloroethylene	ug/L	<50	50	<1.3	1.3			ND
Chlorobenzene	ug/L	<50	50	<1.3	1.3			ND
1,1,1,2-Tetrachloroethane	ug/L	<50	50	<1.3	1.3			ND
Ethylbenzene	ug/L	130	50	1.3	1.3	867	ND	99
p+m-Xylene	ug/L	290	50	1.3	1.3	1933	ND	100
Styrene	ug/L	<50	50	<1.3	1.3			ND
o-Xylene	ug/L	120	50	1.3	1.3	800	ND	99
Bromoform	ug/L	<40	40	<1.0	1.0			ND
1,1,2,2-Tetrachloroethane	ug/L	<100	100	<2.5	2.5			ND
1,2,3-Trichloropropane	ug/L	<60	60	<1.5	1.5			ND
1,3-Dichlorobenzene	ug/L	<50	50	<1.3	1.3			ND
1,4-Dichlorobenzene	ug/L	<50	50	<1.3	1.3			ND
1,2-Dichlorobenzene	ug/L	<50	50	<1.3	1.3			ND

Note- Destruction Efficiency based upon ug/L concetrations. If outlet concentration was ND then the dectection limit was used DE calcs

TO-15 EMISSION CALCULATION SHEET IN WATER

PLANT: L&RR LANDFILL **RUN #:** 2
LOCATION: FLARE STACK **DATE :** 03-DEC-14

VOLATILE ORGANICS BY GC/MS (WATER)

Maxxam ID		YT1481		YT1482				
Sampling TIME		10:45-12:20		10:45-12:20				
COC Number		065734		065734				
	Units	L&RR TO-15-2 INLET	DL	L&RR TO-15-2 OUTLET	DL	INLET UG/M3	OUTLET UG/M3	DE %
Dichlorodifluoromethane (FREON 12)	ug/L	<50	50	<2.5	2.5			ND
Chloromethane	ug/L	<100	100	<5.0	5.0			ND
Vinyl Chloride	ug/L	<20	20	<1.0	1.0			ND
Bromomethane	ug/L	<150	150	<7.5	7.5			ND
Chloroethane	ug/L	<50	50	<2.5	2.5			ND
Trichlorofluoromethane (FREON 11)	ug/L	<100	100	<5.0	5.0			ND
Acetone (2-Propanone)	ug/L	1800	750	38	38	12000	ND	98
1,1-Dichloroethylene	ug/L	<25	25	<1.3	1.3			ND
Iodomethane	ug/L	<30	30	<1.5	1.5			ND
Carbon Disulfide	ug/L	<25	25	<1.3	1.3			ND
Methylene Chloride(Dichloromethane)	ug/L	<50	50	<2.5	2.5			ND
1,1-Dichloroethane	ug/L	<20	20	<1.0	1.0			ND
trans-1,2-Dichloroethylene	ug/L	<50	50	<2.5	2.5			ND
cis-1,2-Dichloroethylene	ug/L	<50	50	<2.5	2.5			ND
Chloroform	ug/L	<20	20	<1.0	1.0			ND
1,2-Dichloroethane	ug/L	<25	25	<1.3	1.3			ND
Methyl Ethyl Ketone (2-Butanone)	ug/L	1500	500	25	25	10000	ND	98
1,1,1-Trichloroethane	ug/L	<25	25	<1.3	1.3			ND
Carbon Tetrachloride	ug/L	<25	25	<1.3	1.3			ND
Benzene	ug/L	<25	25	<1.3	1.3			ND
1,1,2-Trichloroethane	ug/L	<25	25	<1.3	1.3			ND
1,2-Dichloropropane	ug/L	<25	25	<1.3	1.3			ND
Trichloroethylene	ug/L	<25	25	<1.3	1.3			ND
Dibromomethane	ug/L	<25	25	<1.3	1.3			ND
Bromodichloromethane	ug/L	<20	20	<1.0	1.0			ND
cis-1,3-Dichloropropene	ug/L	<20	20	<1.0	1.0			ND
trans-1,3-Dichloropropene	ug/L	<30	30	<1.5	1.5			ND
Dibromochloromethane	ug/L	<20	20	<1.0	1.0			ND
Methyl Isobutyl Ketone	ug/L	<500	500	<25	25			ND
Methyl Butyl Ketone (2-Hexanone)	ug/L	<500	500	<25	25			ND
Toluene	ug/L	340	25	1.3	1.3	2267	ND	100
Ethylene Dibromide	ug/L	<25	25	<1.3	1.3			ND
Tetrachloroethylene	ug/L	<25	25	<1.3	1.3			ND
Chlorobenzene	ug/L	<25	25	<1.3	1.3			ND
1,1,1,2-Tetrachloroethane	ug/L	<25	25	<1.3	1.3			ND
Ethylbenzene	ug/L	89	25	1.3	1.3	593	ND	99
p+m-Xylene	ug/L	200	25	1.3	1.3	1333	ND	99
Styrene	ug/L	<25	25	<1.3	1.3			ND
o-Xylene	ug/L	82	25	1.3	1.3	547	ND	98
Bromoform	ug/L	<20	20	<1.0	1.0			ND
1,1,2,2-Tetrachloroethane	ug/L	<50	50	<2.5	2.5			ND
1,2,3-Trichloropropane	ug/L	<30	30	<1.5	1.5			ND
1,3-Dichlorobenzene	ug/L	<25	25	<1.3	1.3			ND
1,4-Dichlorobenzene	ug/L	27	25	1.3	1.3	180	ND	95
1,2-Dichlorobenzene	ug/L	<25	25	<1.3	1.3			ND

Note- Destruction Efficiency based upon ug/L concetrations. If outlet concentration was ND then the dectection limit was used DE calcs

TO-15 EMISSION CALCULATION SHEET IN WATER

PLANT:	L&RR LANDFILL	**RUN #:**	3
LOCATION:	FLARE STACK	**DATE :**	03-DEC-14

VOLATILE ORGANICS BY GC/MS (WATER)

Maxxam ID		YT1481		YT1482				
Sampling TIME		12:25-14:25		12:25-14:25				
COC Number		065734		065734				
	Units	**L&RR TO-15-3 INLET**	**DL**	**L&RR TO-15-3 OUTLET**	**DL**	**INLET UG/M3**	**OUTLET UG/M3**	**DE %**
Dichlorodifluoromethane (FREON 12)	ug/L	<50	50	<2.5	2.5			ND
Chloromethane	ug/L	<100	100	<5.0	5.0			ND
Vinyl Chloride	ug/L	<20	20	<1.0	1.0			ND
Bromomethane	ug/L	<150	150	<7.5	7.5			ND
Chloroethane	ug/L	<50	50	<2.5	2.5			ND
Trichlorofluoromethane (FREON 11)	ug/L	<100	100	<5.0	5.0			ND
Acetone (2-Propanone)	ug/L	1900	750	38	38	12667	ND	98
1,1-Dichloroethylene	ug/L	<25	25	<1.3	1.3			ND
Iodomethane	ug/L	<30	30	<1.5	1.5			ND
Carbon Disulfide	ug/L	<25	25	<1.3	1.3			ND
Methylene Chloride(Dichloromethane)	ug/L	<50	50	<2.5	2.5			ND
1,1-Dichloroethane	ug/L	<20	20	<1.0	1.0			ND
trans-1,2-Dichloroethylene	ug/L	<50	50	<2.5	2.5			ND
cis-1,2-Dichloroethylene	ug/L	<50	50	<2.5	2.5			ND
Chloroform	ug/L	<20	20	<1.0	1.0			ND
1,2-Dichloroethane	ug/L	<25	25	<1.3	1.3			ND
Methyl Ethyl Ketone (2-Butanone)	ug/L	2100	500	<25	25	14000	ND	ND
1,1,1-Trichloroethane	ug/L	<25	25	<1.3	1.3			ND
Carbon Tetrachloride	ug/L	<25	25	<1.3	1.3			ND
Benzene	ug/L	30	25	1.3	1.3	200	ND	96
1,1,2-Trichloroethane	ug/L	<25	25	<1.3	1.3			ND
1,2-Dichloropropane	ug/L	<25	25	<1.3	1.3			ND
Trichloroethylene	ug/L	<25	25	<1.3	1.3			ND
Dibromomethane	ug/L	<25	25	<1.3	1.3			ND
Bromodichloromethane	ug/L	<20	20	<1.0	1.0			ND
cis-1,3-Dichloropropene	ug/L	<20	20	<1.0	1.0			ND
trans-1,3-Dichloropropene	ug/L	<30	30	<1.5	1.5			ND
Dibromochloromethane	ug/L	<20	20	<1.0	1.0			ND
Methyl Isobutyl Ketone	ug/L	<500	500	<25	25			ND
Methyl Butyl Ketone (2-Hexanone)	ug/L	<500	500	<25	25			ND
Toluene	ug/L	450	25	8.1	1.3	3000	54	98
Ethylene Dibromide	ug/L	<25	25	<1.3	1.3			ND
Tetrachloroethylene	ug/L	<25	25	<1.3	1.3			ND
Chlorobenzene	ug/L	<25	25	<1.3	1.3			ND
1,1,1,2-Tetrachloroethane	ug/L	<25	25	<1.3	1.3			ND
Ethylbenzene	ug/L	120	25	1.3	1.3	800	ND	99
p+m-Xylene	ug/L	260	25	2.1	1.3	1733	14	99
Styrene	ug/L	<25	25	<1.3	1.3			ND
o-Xylene	ug/L	100	25	1.3	1.3	667	ND	99
Bromoform	ug/L	<20	20	<1.0	1.0			ND
1,1,2,2-Tetrachloroethane	ug/L	<50	50	<2.5	2.5			ND
1,2,3-Trichloropropane	ug/L	<30	30	<1.5	1.5			ND
1,3-Dichlorobenzene	ug/L	<25	25	<1.3	1.3			ND
1,4-Dichlorobenzene	ug/L	33	25	1.3	1.3	220	ND	96
1,2-Dichlorobenzene	ug/L	<25	25	<1.3	1.3			ND

Note- Destruction Efficiency based upon ug/L concetrations. If outlet concentration was ND then the dectection limit was used DE calcs

TO-15 EMISSION CALCULATION SHEET TOTAL AIR AND WATER

PLANT: L&RR LANDFILL RUN #: 1
LOCATION: FLARE STACK DATE : 03-DEC-14

	Units	TO-15-1 INLET AIR	TO-15-1 INLET WATER	TOTAL INLET RUN 1	TOTAL OUT RUN 1	DE %
Toluene	ug/m3	133000	3200	136200	5900	96
Ethylbenzene	ug/m3	33900	867	34767	380	99
p+m-Xylene	ug/m3	58300	1933	60233	466	99
o-Xylene	ug/m3	14100	800	14900	114	99
Acetone (2-Propanone)	ug/m3	ND	16000	16000	6493	59

TO-15 EMISSION CALCULATION SHEET TOTAL AIR AND WATER

PLANT: L&RR LANDFILL RUN #: 2
LOCATION: FLARE STACK DATE : 03-DEC-14

	Units	TO-15-2 INLET AIR	TO-15-2 INLET WATER	TOTAL INLET RUN 2	TOTAL OUT RUN 2	DE %
Toluene	ug/m3	103000	2267	105267	5360	95
Ethylbenzene	ug/m3	33000	593	33593	257	99
p+m-Xylene	ug/m3	57100	1333	58433	466	99
o-Xylene	ug/m3	14100	800	14900	284	98
Acetone (2-Propanone)	ug/m3	ND	12000	12000	817	93
1,4-Dichlorobenzene	ug/m3	1060	180	1240	45.7	96

TO-15 EMISSION CALCULATION SHEET TOTAL AIR AND WATER

PLANT: L&RR LANDFILL RUN #: 3
LOCATION: FLARE STACK DATE : 03-DEC-14

	Units	TO-15-3 INLET AIR	TO-15-3 INLET WATER	TOTAL INLET RUN 3	TOTAL OUT RUN 3	DE %
Toluene	ug/m3	133000	3000	136000	2124	98
Ethylbenzene	ug/m3	41700	800	42500	388	99
p+m-Xylene	ug/m3	72100	1733	73833	398	99
o-Xylene	ug/m3	17500	677	18177	101	99
Acetone (2-Propanone)	ug/m3	12667	0	12667	103	99
1,4-Dichlorobenzene	ug/m3	1430	220	1650	63.4	96

COMPOUND	Units	INLET RUN 1	OUTLET RUN 1	DE %	INLET RUN 2	OUTLET RUN 2	DE %	INLET RUN 3	OUTLET RUN 3	DE %	INLET AVG	OUTLET AVG	AVG DE %
Dichlorodifluoromethane (FREON 12)	ug/m3	593	17.8	97	595	18.8	97	683	17	98	624	18	97
1,2-Dichlorotetrafluoroethane	ug/m3	846	22.0	97	850	22.9	97	975	24.2	98	890	23	97
Chloromethane	ug/m3	129	15.7	88	ND	12.7	NA	ND	8.52	ND	ND	12	ND
Vinyl Chloride	ug/m3	2240	45.1	98	2280	51.3	98	2730	60.7	98	2417	52	98
Chloroethane	ug/m3	314	14.2	95	295	15	95	351	1.2	100	320	10	97
1,3-Butadiene	ug/m3	<210	52.8	ND	ND	44.7	NA	ND	38.8	ND	ND	45	ND
Acetone (2-Propanone)	ug/m3	16000	6493	59	12000	817	93	12667	103	99	13556	2471	82
Methyl Ethyl Ketone (2-Butanone)	ug/m3	12667	167	99	ND	ND	ND	ND	ND	ND	ND	ND	ND
cis-1,2-Dichloroethylene	ug/m3	2190	35.4	98	2120	39	98	2670	52.8	98	2327	42	98
Chloroform	ug/m3	<139	17.3	0	ND	19.2	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	ug/m3	717	14.6	98	772	54	93	933	0.809	100	807	23	97
Trichloroethylene	ug/m3	374	29	92	422	30.6	93	476	10.9	98	424	24	94
Tetrachloroethylene	ug/m3	632	24.4	96	622	25.8	96	748	20.1	97	667	23	96
Benzene	ug/m3	7840	329	96	7450	361	95	8940	523	94	8077	404	95
Toluene	ug/m3	136200	5900	96	105267	5360	95	136000	2124	98	125822	4461	96
Ethylbenzene	ug/m3	34767	380	99	33593	257	99	42500	388	99	36953	342	99
p+m-Xylene	ug/m3	60233	466	99	58433	466	99	73833	398	99	64166	443	99
o-Xylene	ug/m3	14900	114	99	14900	284	98	18177	101	99	15992	166	99
Styrene	ug/m3	441	22.2	95	405	17.3	96	514	36.6	93	453	25	94
4-ethyltoluene	ug/m3	ND	ND	ND	1980	205	90	2540	10.8	100	ND	ND	ND
1,3,5-Trimethylbenzene	ug/m3	2580	44.2	98	2530	46.7	98	3200	5.53	100	2770	32	99
1,2,4-Trimethylbenzene	ug/m3	4910	44.2	99	4820	46.7	99	6260	3.42	100	5330	31	99
Chlorobenzene	ug/m3	1210	24.5	98	1220	27.8	98	1590	46.9	97	1340	33	98
1,4-Dichlorobenzene	ug/m3	1080	43.3	96	1060	45.7	96	1430	63.4	96	1190	51	96
Hexane	ug/m3	8830	188	98	7140	233	97	9180	116	99	8383	179	98
Heptane	ug/m3	4980	59.3	99	4680	60.9	99	5710	77.4	99	5123	66	99
Cyclohexane	ug/m3	3610	49.6	99	3410	46.4	99	4150	51.3	99	3723	49	99
Total Xylenes	ug/m3	72300	580	99	70800	360	99	89600	485	99	77567	475	99
Propene	ug/m3	8160	749	91	7760	759	90	9300	1110	88	8407	873	90
2,2,4-Trimethylpentane	ug/m3	490	16.8	97	366	17.8	95	480	6.89	99	445	14	97

VOLUMETRIC FLOWRATE CALCULATION SHEET

FACILITY: L&RR
UNIT: FLARE
DATE: 12/3/14

RUN ID#: IN-1
START TIME: 10:40
END TIME: 10:45

Ds (FT)	0.67
As (SQFT)	0.35
PIT COEFF	0.99
P BAR	29.85
P STK	5.00
BWO	0.020
1 - BWO	0.980
TS (R')	556.00
PS (ABS)	30.22
Ms (WET)	28.00

TRAV PT	DELTA P	SQUARE ROOT	STACK TEMP
A1	0.00	0.00	96
2	0.00	0.00	95
3	0.00	0.00	96
4	0.22	0.47	96
5	0.29	0.54	97
6	0.31	0.56	96
7	0.33	0.57	96
8	0.28	0.53	96
AVERAGE:	0.18	0.33	96.00

G = SQRT (TS / PS/ MS) 0.81

VS = 85.49(CP) (G) (SQRT DELTA P) 22.88 FPS

Qs = 3600(1-BWO)(VS)(AS)(17.64)(PS)/(TS) 27014 DSCFH

DSCFH / 60 450 DSCFM

(VS) (AS) (60) 479 ACFM

(DSCFM) / (1-BWO) **459** WSCFM

VOLUMETRIC FLOWRATE CALCULATION SHEET

FACILITY: L&RR
UNIT: FLARE
DATE: 12/3/14

RUN ID#: IN-2
START TIME: 12:25
END TIME: 12:30

		TRAV PT	DELTA P	SQUARE ROOT	STACK TEMP
Ds (FT)	0.67				
As (SQFT)	0.35				
		A1	0.00	0.00	95
PIT COEFF	0.99	2	0.00	0.00	95
		3	0.00	0.00	95
P BAR	29.85	4	0.21	0.46	95
		5	0.29	0.54	95
P STK	5.00	6	0.33	0.57	96
		7	0.32	0.57	96
BWO	0.020	8	0.29	0.54	95
1 - BWO	0.980				
TS (R')	555.25				
PS (ABS)	30.22				
Ms (WET)	28.00				
		AVERAGE:	0.18	0.33	95.25

G	=	SQRT (TS / PS/ MS)	0.81	
VS	=	85.49(CP) (G) (SQRT DELTA P)	22.93	FPS
Qs	=	3600(1-BWO)(VS)(AS)(17.64)(PS)/(TS)	27108	DSCFH
		DSCFH / 60	452	DSCFM
		(VS) (AS) (60)	480	ACFM
		(DSCFM) / (1-BWO)	**461**	WSCFM

VOLUMETRIC FLOWRATE CALCULATION SHEET

FACILITY: L&RR
UNIT: FLARE
DATE: 12/3/14

RUN ID#: IN-3
START TIME: 14:40
END TIME: 14:45

Ds (FT)	0.67
As (SQFT)	0.35
PIT COEFF	0.99
P BAR	29.85
P STK	5.00
BWO	0.020
1 - BWO	0.980
TS (R')	555.25
PS (ABS)	30.22
Ms (WET)	28.00

TRAV PT	DELTA P	SQUARE ROOT	STACK TEMP
A1	0.00	0.00	94
2	0.00	0.00	95
3	0.00	0.00	95
4	0.22	0.47	95
5	0.30	0.55	96
6	0.32	0.57	96
7	0.32	0.57	95
8	0.29	0.54	96
AVERAGE:	0.18	0.34	95.25

G = SQRT (TS / PS/ MS) 0.81

VS = 85.49(CP) (G) (SQRT DELTA P) 23.03 FPS

Qs = 3600(1-BWO)(VS)(AS)(17.64)(PS)/(TS) 27222 DSCFH

DSCFH / 60 454 DSCFM

(VS) (AS) (60) 482 ACFM

(DSCFM) / (1-BWO) **463** WSCFM

Appendix F

Calibration Error Test, Run 1 STRATA Version 3.2
Operator: Sean MacKay
Plant Name: L&RR Landfill Flare
Location: Stack

	Reference Cylinder Numbers			
	Zero	Low-range	Mid-range	High-range
O2				
CO2				
CO				
NOx				
SO2				
THC				
CH4				

Date/Time 12-02-2014 09:11:28 PASSED

Analyte	O2	CO2	CO	NOx	SO2	THC	CH4
Units	%	%	ppm	ppm	ppm	ppm	ppm
Zero Ref Cyl	0.000	0.000	0.000	0.000	0.000	0.00	0.00
Zero Avg	0.004	0.002	0.138	0.106	0.546	0.03	0.03
Zero Error%	0.0%	0.0%	0.1%	0.1%	0.6%	0.0%	0.0%
Low Ref Cyl						30.68	30.68
Low Avg						30.38	31.02
Low Error%						0.3%	0.3%
Mid Ref Cyl	11.340	9.860	47.000	53.100	48.600	56.64	56.64
Mid Avg	11.476	9.904	47.856	53.864	48.349	56.69	55.72
Mid Error%	0.6%	0.2%	0.9%	0.8%	0.3%	0.0%	0.9%
High Ref Cyl	22.700	19.850	94.810	94.870	94.500	90.58	90.58
High Avg	23.027	19.650	95.262	94.118	93.491	90.04	90.39
High Error%	1.4%	1.0%	0.5%	0.8%	1.1%	0.5%	0.2%

Calibration Error Test End

Test Run 1 STRATA Version 3.2

	O2	CO2	CO	NOx	SO2	THC	CH4
	%	%	ppm	ppm	ppm	ppm	ppm
Begin calculating run averages							
12-02-2014 09:14:16	21.326	0.000	0.157	46.333	1.073	102.28*	91.56*
12-02-2014 09:15:16	21.325	0.000	0.156	46.911	1.124	102.29*	102.16*
Run Averages	O2	CO2	CO	NOx	SO2	THC	CH4
	%	%	ppm	ppm	ppm	ppm	ppm
12-02-2014 09:15:20	21.326	0.000	0.158	46.636	1.098	102.28*	97.03*

Operator: Sean MacKay
Plant Name: L&RR Landfill Flare
Location: Stack
Test Run 1 End

NOx Converter Eff

$NO_2 = 48.3$

$$Eff = 1 - \frac{48.3 - 46.9}{48.3} \times 100 = 97.1\%$$

Initial System Bias Check, Run 1 STRATA Version 3.2
Operator: Sean MacKay
Plant Name: L&RR Landfill Flare
Location: Stack

Reference Cylinder Numbers
Zero Span

O2
CO2
CO
NOx
SO2
THC
CH4

Date/Time 12-02-2014 09:48:45 PASSED

Analyte	O2	CO2	CO	NOx	SO2	THC	CH4
Units	%	%	ppm	ppm	ppm	ppm	ppm
Zero Ref Cyl	0.000	0.000	0.0	0.000	0.000	0.0	0.0
Zero Cal	0.004	0.002	0.1	0.106	0.546	0.0	0.0
Zero Avg	0.020	0.022	0.2	0.208	0.090	0.0	0.0
Zero Bias%	0.1%	0.1%	0.0%	0.1%	0.5%	0.0%	0.0%
Zero Drift%							
Span Ref Cyl	11.340	9.860	47.0	53.100	48.600	0.0	0.0
Span Cal	11.476	9.904	47.9	53.864	48.349	0.0	0.0
Span Avg	11.460	9.953	46.3	53.209	47.314	0.0	0.0
Span Bias%	0.1%	0.2%	0.1%	0.7%	1.1%	0.0%	0.0%
Span Drift%							

System Bias Check End

Test Run 1 STRATA Version 3.2

	O2 %	CO2 %	CO ppm	NOx ppm	SO2 ppm	THC ppm	CH4 ppm
Begin calculating run averages							
12-02-2014 11:28:49	16.888	3.973	686.5	2.538	-0.178	5980.2	5971.2
12-02-2014 11:29:49	16.422	4.252	765.5	2.585	-0.175	5763.3	5595.7
12-02-2014 11:30:49	15.761	4.788	950.4	2.454	-0.042	5315.4	5407.7
12-02-2014 11:31:49	15.379	5.086	1141.7	2.664	-0.042	5029.2	5407.8
12-02-2014 11:32:49	15.390	5.090	1148.5	2.834	-0.038	5014.4	4965.8
12-02-2014 11:33:49	15.503	5.033	1078.4	2.898	-0.097	5377.5	4709.9
12-02-2014 11:34:49	16.279	4.471	804.4	2.790	-0.085	5842.3	4709.9
12-02-2014 11:35:49	16.891	4.000	686.7	2.737	-0.132	5931.0	5139.3
12-02-2014 11:36:49	17.124	3.829	646.5	2.582	-0.145	5889.1	5387.8
12-02-2014 11:37:49	17.172	3.792	641.0	2.506	-0.128	6035.5	5387.8
12-02-2014 11:38:49	17.158	3.793	648.0	2.473	-0.158	6059.1	5447.9
12-02-2014 11:39:49	16.552	4.155	740.3	2.534	-0.138	5643.6	5482.7
12-02-2014 11:40:49	15.731	4.786	968.1	2.403	-0.072	5250.0	5482.7
12-02-2014 11:41:49	15.435	5.062	1108.3	2.586	-0.045	5131.8	4947.3
12-02-2014 11:42:49	15.464	5.049	1117.3	2.700	-0.115	5132.8	4664.2
12-02-2014 11:43:49	15.528	5.009	1059.2	2.855	-0.117	5155.9	4664.2
12-02-2014 11:44:49	15.902	4.755	892.6	2.763	-0.120	5376.1	4919.5
12-02-2014 11:45:49	16.667	4.173	717.1	2.724	-0.111	5727.6	5048.5
12-02-2014 11:46:49	16.963	3.928	661.5	2.696	-0.160	5695.8	5048.5
12-02-2014 11:47:49	16.982	3.909	664.1	2.607	-0.184	5734.9	5360.6
12-02-2014 11:48:49	17.019	3.891	654.5	2.578	-0.142	5740.6	5517.0
12-02-2014 11:49:49	16.991	3.912	670.7	2.560	-0.153	6036.3	5517.0
12-02-2014 11:50:49	16.497	4.201	744.8	2.585	-0.200	5604.2	5270.4
12-02-2014 11:51:49	15.730	4.797	952.7	2.447	-0.145	5165.5	5127.6
12-02-2014 11:52:49	15.398	5.098	1122.4	2.619	-0.063	5114.0	5127.6
12-02-2014 11:53:49	15.459	5.068	1109.9	2.789	-0.072	5256.5	4770.7
12-02-2014 11:54:49	15.472	5.058	1108.0	2.831	-0.091	5165.7	4564.0
12-02-2014 11:55:49	15.989	4.703	868.7	2.825	-0.159	5439.2	4564.1
12-02-2014 11:56:49	16.768	4.093	698.3	2.792	-0.139	5753.1	5075.8
12-02-2014 11:57:49	17.160	3.811	641.7	2.633	-0.201	5993.0	5371.9
12-02-2014 11:58:49	17.185	3.781	635.6	2.505	-0.206	5875.7	5372.0
12-02-2014 11:59:49	17.141	3.807	642.2	2.505	-0.186	5941.1	5460.8
12-02-2014 12:00:49	16.850	3.978	691.6	2.537	-0.136	5833.4	5512.2
12-02-2014 12:01:49	16.002	4.556	863.6	2.512	-0.088	5356.9	5512.2
12-02-2014 12:02:49	15.378	5.091	1141.6	2.517	-0.120	5086.7	4895.3
12-02-2014 12:03:49	15.364	5.132	1169.6	2.751	-0.097	5195.2	4569.3
12-02-2014 12:04:49	15.438	5.083	1137.3	2.839	-0.051	5269.1	4569.3
12-02-2014 12:05:49	15.510	5.042	1086.5	2.919	-0.103	5240.8	4787.4
12-02-2014 12:06:49	16.373	4.391	765.3	2.777	-0.139	5628.1	4898.4
12-02-2014 12:07:49	17.030	3.922	662.3	2.730	-0.140	6040.4	4898.4
12-02-2014 12:08:49	17.220	3.750	629.3	2.526	-0.200	5770.5	5535.5
12-02-2014 12:09:49	17.166	3.790	634.4	2.506	-0.177	5814.1	5856.1
12-02-2014 12:10:49	17.129	3.816	646.9	2.506	-0.169	5961.6	5856.1
12-02-2014 12:11:49	16.482	4.203	755.3	2.557	-0.133	5694.6	5806.5
12-02-2014 12:12:49	15.658	4.863	994.4	2.440	-0.096	5196.4	5781.7
12-02-2014 12:13:49	15.320	5.151	1180.2	2.647	-0.047	4862.9	5781.7
12-02-2014 12:14:49	15.411	5.097	1151.9	2.873	-0.057	5018.2	4936.9
12-02-2014 12:15:49	15.444	5.078	1137.6	2.936	-0.078	5101.1	4514.2
12-02-2014 12:16:49	16.073	4.627	841.0	2.842	-0.151	5473.9	4514.2
12-02-2014 12:17:49	16.917	4.002	671.8	2.760	-0.186	5688.7	4962.7
12-02-2014 12:18:49	17.173	3.792	640.7	2.614	-0.236	5994.2	5222.5
12-02-2014 12:19:49	17.169	3.792	641.6	2.505	-0.213	6046.7	5222.7
12-02-2014 12:20:49	17.155	3.802	645.4	2.506	-0.169	6080.9	5469.2
12-02-2014 12:21:49	16.726	4.050	716.0	2.537	-0.146	5886.6	5611.9
12-02-2014 12:22:49	15.859	4.681	917.8	2.497	-0.130	5159.3	5611.9
12-02-2014 12:23:49	15.340	5.140	1160.1	2.614	-0.076	4873.6	4711.7
12-02-2014 12:24:49	15.295	5.168	1231.3	2.897	-0.037	4736.8	4190.4
12-02-2014 12:25:49	15.371	5.114	1180.0	3.025	-0.083	4817.1	4190.5
12-02-2014 12:26:49	15.933	4.752	905.1	2.947	-0.129	5653.5	4345.6
12-02-2014 12:27:49	16.792	4.084	698.0	2.794	-0.242	5895.6	4429.9
12-02-2014 12:28:49	17.124	3.839	649.4	2.662	-0.247	5885.1	4429.9
12-02-2014 12:29:49	17.154	3.800	643.4	2.558	-0.215	5912.2	5286.3
12-02-2014 12:30:49	17.112	3.830	646.7	2.521	-0.216	5937.1	5722.0
12-02-2014 12:31:49	16.895	3.956	686.5	2.524	-0.272	6005.3	5722.0
12-02-2014 12:32:49	16.128	4.472	828.5	2.578	-0.182	5426.5	5834.7
12-02-2014 12:33:49	15.422	5.057	1118.0	2.505	-0.110	4869.9	5891.2
12-02-2014 12:34:49	15.284	5.178	1216.4	2.840	-0.177	4783.5	5891.4
12-02-2014 12:35:49	15.423	5.089	1135.2	2.941	-0.138	4956.7	4777.8
12-02-2014 12:36:49	15.740	4.890	979.4	2.876	-0.132	5467.6	4220.5
12-02-2014 12:37:49	16.588	4.236	731.6	2.807	-0.160	5916.3	4220.5
12-02-2014 12:38:49	17.086	3.863	653.0	2.695	-0.232	5799.2	5206.0
12-02-2014 12:39:49	17.132	3.821	644.8	2.559	-0.278	5783.8	5776.6
12-02-2014 12:40:49	17.155	3.803	641.3	2.524	-0.185	5922.7	5776.6
12-02-2014 12:41:49	17.026	3.879	672.2	2.507	-0.151	6105.4	5688.4
12-02-2014 12:42:49	16.314	4.338	813.8	2.555	-0.173	5765.4	5637.3
12-02-2014 12:43:49	15.416	5.061	1133.2	2.442	-0.190	5042.6	5637.3
12-02-2014 12:44:49	15.371	5.142	1183.6	2.806	-0.134	4962.7	4717.2
12-02-2014 12:45:49	15.327	5.169	1219.7	2.873	-0.082	4965.4	4230.5
12-02-2014 12:46:49	15.525	5.046	1068.9	2.957	-0.102	5224.3	4230.6
12-02-2014 12:47:49	16.370	4.414	771.2	2.823	-0.127	5758.1	4538.8
12-02-2014 12:48:49	17.025	3.929	665.1	2.724	-0.193	6020.9	4694.3
12-02-2014 12:49:49	17.184	3.788	641.2	2.522	-0.318	5970.9	4694.3
12-02-2014 12:50:49	17.195	3.779	635.6	2.506	-0.258	5669.6	5479.1
12-02-2014 12:51:49	17.068	3.839	642.2	2.524	-0.233	5611.1	5872.2

12-02-2014 12:52:49	16.468	4.206	748.0	2.609	-0.225	5384.5	5872.5
12-02-2014 12:53:49	15.730	4.801	956.3	2.341	-0.145	5047.1	5160.9
12-02-2014 12:54:49	15.442	5.068	1137.4	2.425	-0.128	4704.7	4805.0
12-02-2014 12:55:49	15.517	4.983	1129.3	2.424	-0.103	4785.7	4805.1
12-02-2014 12:56:49	15.363	5.134	1192.0	2.657	-0.120	4964.6	4501.4
12-02-2014 12:57:49	15.971	4.714	868.2	2.608	-0.142	5291.9	4325.5
12-02-2014 12:58:49	16.803	4.083	688.7	2.674	-0.173	5784.5	4325.5
12-02-2014 12:59:49	17.137	3.821	642.0	2.625	-0.221	5782.3	5147.2
12-02-2014 13:00:49	17.116	3.830	643.7	2.507	-0.189	5850.9	5622.7
12-02-2014 13:01:49	17.055	3.868	652.2	2.507	-0.283	5806.0	5622.7
12-02-2014 13:02:49	16.895	3.957	672.7	2.507	-0.230	5734.9	5556.7
12-02-2014 13:03:49	16.182	4.432	815.5	2.426	-0.091	5512.0	5522.7
12-02-2014 13:04:49	15.504	5.004	1097.8	2.192	-0.100	4841.1	5522.7
12-02-2014 13:05:49	15.311	5.158	1205.4	2.575	0.020	4694.9	4463.4
12-02-2014 13:06:49	15.371	5.132	1218.2	2.673	-0.003	4710.0	3931.0
12-02-2014 13:07:49	15.707	4.915	1005.1	2.667	-0.036	5060.3	3931.0
12-02-2014 13:08:49	16.599	4.230	724.5	2.608	-0.158	5674.4	4366.7
12-02-2014 13:09:49	17.043	3.904	651.7	2.688	-0.148	5736.4	4584.8
12-02-2014 13:10:49	17.086	3.839	641.6	2.609	-0.186	5602.0	4584.8
12-02-2014 13:11:49	17.093	3.844	643.8	2.575	-0.140	5942.9	4867.3
12-02-2014 13:12:49	17.068	3.861	659.0	2.507	-0.199	5969.2	5008.5
12-02-2014 13:13:49	16.474	4.225	750.6	2.523	-0.184	5656.1	5008.6
12-02-2014 13:14:49	15.631	4.895	1009.0	2.221	-0.153	5138.6	4920.3
12-02-2014 13:15:49	15.224	5.227	1310.0	2.514	-0.088	4632.8	4869.3
12-02-2014 13:16:49	15.289	5.199	1258.4	2.783	-0.041	4804.2	4869.2
12-02-2014 13:17:49	15.512	5.048	1095.1	2.605	-0.046	5085.0	4457.6
12-02-2014 13:18:49	16.509	4.303	742.2	2.527	-0.148	5756.8	4230.6
12-02-2014 13:19:49	16.997	3.930	661.8	2.688	-0.201	5723.6	4230.6
12-02-2014 13:20:49	17.026	3.883	647.7	2.609	-0.152	5650.3	4887.6
12-02-2014 13:21:49	17.087	3.850	646.2	2.557	-0.197	5866.8	5223.1
12-02-2014 13:22:49	17.055	3.880	660.5	2.519	-0.246	6035.1	5223.1
12-02-2014 13:23:49	16.750	4.052	708.5	2.506	-0.191	5750.9	5575.5
12-02-2014 13:24:49	15.941	4.611	896.7	2.279	-0.201	5194.3	5752.5
12-02-2014 13:25:49	15.321	5.146	1195.3	2.341	-0.072	4675.8	5752.8

Test Run 1 STRATA Version 3.2

	O2	CO2	CO	NOx	SO2	THC	CH4
	%	%	ppm	ppm	ppm	ppm	ppm
12-02-2014 13:26:48	15.384	5.118	1285.2	2.643	-0.066	4499.9	4435.6
12-02-2014 13:27:48	15.380	5.086	1215.1	2.659	-0.036	4757.0	3741.5
12-02-2014 13:28:48	16.127	4.616	848.8	2.542	-0.129	5326.9	3741.5
12-02-2014 13:29:48	16.836	4.048	680.1	2.642	-0.158	5597.2	4632.7
12-02-2014 13:30:48	17.149	3.814	628.3	2.676	-0.233	5467.8	5148.8
12-02-2014 13:31:48	17.297	3.711	618.7	2.508	-0.259	5879.8	5148.8
12-02-2014 13:32:48	17.236	3.747	628.3	2.476	-0.227	5872.3	5467.6
12-02-2014 13:33:48	16.808	4.000	691.9	2.494	-0.203	5663.3	5652.2
12-02-2014 13:34:48	15.891	4.677	909.5	2.376	-0.258	5289.5	5652.3
12-02-2014 13:35:48	15.237	5.199	1282.4	2.293	-0.188	4655.7	4963.8
12-02-2014 13:36:48	15.197	5.273	1350.6	2.742	-0.167	4653.1	4565.1
12-02-2014 13:37:48	15.431	5.094	1220.5	2.742	-0.130	4738.0	4565.1
12-02-2014 13:38:48	15.966	4.736	902.4	2.575	-0.131	5565.1	3951.4
12-02-2014 13:39:48	16.830	4.077	693.9	2.675	-0.128	5777.7	3591.7
12-02-2014 13:40:48	17.142	3.830	632.2	2.671	-0.248	5452.3	3591.7
12-02-2014 13:41:48	17.263	3.736	614.9	2.506	-0.328	5595.2	4564.2
12-02-2014 13:42:48	17.230	3.761	626.7	2.486	-0.326	5771.9	5128.5
12-02-2014 13:43:48	16.836	3.989	686.1	2.506	-0.252	5505.1	5128.5
12-02-2014 13:44:48	15.936	4.647	878.7	2.383	-0.259	5274.1	5087.5
12-02-2014 13:45:48	15.442	5.083	1173.0	2.299	-0.145	4502.8	5063.8
12-02-2014 13:46:48	15.339	5.133	1314.2	2.601	-0.146	4528.5	5063.8
12-02-2014 13:47:48	15.486	5.084	1203.3	2.688	-0.090	4592.5	4716.2
12-02-2014 13:48:48	16.134	4.591	867.2	2.457	-0.126	5526.3	4515.0
12-02-2014 13:49:48	16.791	4.104	701.0	2.629	-0.223	5833.5	4515.0
12-02-2014 13:50:48	17.093	3.856	645.0	2.671	-0.225	5680.6	5023.5
12-02-2014 13:51:48	17.058	3.869	642.1	2.610	-0.291	5484.5	5318.0
12-02-2014 13:52:48	17.055	3.881	648.8	2.610	-0.260	5786.4	5318.1
12-02-2014 13:53:48	16.978	3.920	659.1	2.524	-0.330	5498.4	5381.4
12-02-2014 13:54:48	16.377	4.304	773.3	2.462	-0.240	5411.2	5418.0
12-02-2014 13:55:48	15.641	4.897	1006.6	2.157	-0.249	5112.9	5418.0
12-02-2014 13:56:48	15.664	4.898	1023.5	2.230	-0.162	4859.0	5099.7
12-02-2014 13:57:48	15.520	5.024	1078.1	2.404	-0.194	5119.0	4914.3
12-02-2014 13:58:48	15.513	5.036	1064.8	2.467	-0.133	5033.4	4914.3
12-02-2014 13:59:48	16.209	4.553	821.9	2.475	-0.191	5606.6	4848.2
12-02-2014 14:00:48	16.819	4.066	686.7	2.696	-0.294	5764.6	4809.9
12-02-2014 14:01:48	17.047	3.887	658.1	2.640	-0.278	5845.1	4809.9
12-02-2014 14:02:48	17.067	3.873	656.2	2.572	-0.259	5918.0	5321.7
12-02-2014 14:03:48	17.014	3.897	659.1	2.559	-0.297	5898.0	5617.9
12-02-2014 14:04:48	16.832	4.004	698.3	2.510	-0.331	5723.6	5617.9
12-02-2014 14:05:48	15.969	4.619	857.2	2.395	-0.308	5319.0	5264.2
12-02-2014 14:06:48	15.581	4.973	1013.0	2.229	-0.253	5004.7	5059.3
12-02-2014 14:07:48	15.653	4.921	1024.2	2.359	-0.261	4894.5	5059.3
12-02-2014 14:08:48	15.543	5.009	1040.6	2.555	-0.255	4967.7	4850.4
12-02-2014 14:09:48	15.596	4.978	996.3	2.747	-0.227	5035.4	4729.6
12-02-2014 14:10:48	16.278	4.483	791.0	2.795	-0.339	5558.8	4729.6
12-02-2014 14:11:48	16.862	4.040	684.0	2.818	-0.381	5527.2	5344.7
12-02-2014 14:12:48	17.056	3.882	651.6	2.676	-0.418	5657.2	5707.7
12-02-2014 14:13:48	17.070	3.869	651.5	2.656	-0.387	5829.2	5707.5
12-02-2014 14:14:48	17.046	3.889	652.1	2.610	-0.441	5659.0	5638.2
12-02-2014 14:15:48	16.691	4.093	711.1	2.626	-0.448	5445.5	5597.9
12-02-2014 14:16:48	15.859	4.708	907.8	2.518	-0.423	5136.0	5597.9
12-02-2014 14:17:48	15.398	5.109	1124.6	2.571	-0.393	4680.7	4839.9
12-02-2014 14:18:48	15.277	5.216	1237.7	2.885	-0.325	4622.5	4400.6
12-02-2014 14:19:48	15.314	5.180	1205.7	2.988	-0.297	4750.5	4400.5
12-02-2014 14:20:48	15.968	4.759	874.8	2.895	-0.401	5391.0	4529.7
12-02-2014 14:21:48	16.832	4.082	693.7	2.808	-0.455	5822.7	4604.5
12-02-2014 14:22:48	17.093	3.869	651.8	2.669	-0.510	5796.5	4604.5
12-02-2014 14:23:48	17.086	3.866	653.5	2.610	-0.529	5751.4	5283.9
12-02-2014 14:24:48	17.053	3.889	656.0	2.576	-0.482	5789.8	5677.3
12-02-2014 14:25:48	16.935	3.954	675.5	2.610	-0.435	5749.6	5677.3
12-02-2014 14:26:48	16.255	4.401	799.6	2.586	-0.549	5487.3	5525.7
12-02-2014 14:27:48	15.575	4.976	1022.5	2.446	-0.470	4872.2	5438.0
Run Averages	O2	CO2	CO	NOx	SO2	THC	CH4
	%	%	ppm	ppm	ppm	ppm	ppm
12-02-2014 14:27:48	16.307	4.423	857.8	2.606	-0.190	5444.6	5045.4

Operator: Sean MacKay
Plant Name: L&RR Landfill Flare
Location: Stack
Test Run 1 End

Final System Bias Check, Run 1 STRATA Version 3.2
Operator: Sean MacKay
Plant Name: L&RR Landfill Flare
Location: Stack

Reference Cylinder Numbers

	Zero	Span
O2		
CO2		
CO		
NOx		
SO2		
THC		
CH4		

Date/Time 12-02-2014 14:36:18 PASSED

Analyte	O2	CO2	CO	NOx	SO2	THC	CH4
Units	%	%	ppm	ppm	ppm	ppm	ppm
Zero Ref Cyl	0.000	0.000	0.0	0.000	0.000	0.0	0.0
Zero Cal	0.004	0.002	0.1	0.106	0.546	0.0	0.0
Zero Avg	0.030	0.067	0.2	0.409	-0.708	0.0	0.0
Zero Bias%	0.1%	0.3%	0.0%	0.3%	1.3%	0.0%	0.0%
Zero Drift%	0.0%	0.2%	0.0%	0.2%	-0.8%	0.0%	0.0%
Span Ref Cyl	11.340	9.860	47.0	53.100	48.600	0.0	0.0
Span Cal	11.476	9.904	47.9	53.864	48.349	0.0	0.0
Span Avg	11.436	10.114	46.3	53.511	46.216	0.0	0.0
Span Bias%	0.2%	1.1%	0.1%	0.4%	2.3%	0.0%	0.0%
Span Drift%	-0.1%	0.8%	0.0%	0.3%	-1.2%	0.0%	0.0%
Ini Zero Avg	0.020	0.022	0.2	0.208	0.090	0.0	0.0
Ini Span Avg	11.460	9.953	46.3	53.209	47.314	0.0	0.0
Run Avg	16.307	4.423	857.8	2.606	-0.190	5444.6	5045.4
Co	0.025	0.045	0.2	0.308	-0.309	0.0	0.0
Cm	11.448	10.033	46.3	53.360	46.765	0.0	0.0
Correct Avg	16.163	4.322	874.7	2.300	0.122	0.0	0.0

System Bias Check End

Test Run 2 STRATA Version 3.2

	O2	CO2	CO	NOx	SO2	THC	CH4
	%	%	ppm	ppm	ppm	ppm	ppm
Begin calculating run averages							
12-02-2014 15:08:27	15.537	4.994	1070.5	2.278	0.422	4946.2	5176.5
12-02-2014 15:09:27	15.162	5.301	1351.9	2.731	0.472	4842.6	4694.7
12-02-2014 15:10:27	15.231	5.271	1317.2	2.827	0.468	4803.9	4694.7
12-02-2014 15:11:27	15.607	5.021	1050.7	2.889	0.457	5354.9	4831.1
12-02-2014 15:12:27	16.294	4.507	788.1	2.751	0.392	5499.9	5148.8
12-02-2014 15:13:27	17.024	3.949	660.9	2.705	0.362	5794.1	5148.8
12-02-2014 15:14:27	17.163	3.817	636.8	2.527	0.340	5846.5	5323.9
12-02-2014 15:15:27	17.350	3.700	617.4	2.428	0.343	5928.9	5732.5
12-02-2014 15:16:27	17.214	3.777	637.9	2.401	0.386	5888.7	5732.4
12-02-2014 15:17:27	16.421	4.279	769.1	2.473	0.344	5672.7	5608.2
12-02-2014 15:18:27	15.620	4.930	1015.7	2.401	0.398	4978.4	5318.2
12-02-2014 15:19:27	15.222	5.262	1316.7	2.674	0.465	4683.0	5318.2
12-02-2014 15:20:27	15.195	5.302	1354.6	2.853	0.474	4816.4	5123.2
12-02-2014 15:21:27	15.386	5.194	1183.9	2.989	0.500	4992.9	4659.7
12-02-2014 15:22:27	16.152	4.613	809.8	2.795	0.435	5520.4	4659.7
12-02-2014 15:23:27	16.795	4.122	686.0	2.780	0.391	5776.1	4877.6
12-02-2014 15:24:27	17.262	3.774	631.3	2.537	0.331	5961.6	5388.0
12-02-2014 15:25:27	17.197	3.803	634.2	2.506	0.393	5873.8	5388.1
12-02-2014 15:26:27	17.254	3.770	634.2	2.447	0.368	6021.5	5464.5
12-02-2014 15:27:27	16.678	4.106	721.8	2.436	0.358	5723.3	5642.8
12-02-2014 15:28:27	15.820	4.775	917.1	2.451	0.383	5217.0	5643.0
12-02-2014 15:29:27	15.236	5.252	1263.3	2.598	0.495	4716.3	5250.8
12-02-2014 15:30:27	15.239	5.283	1289.6	2.947	0.443	4808.2	4335.4
12-02-2014 15:31:27	15.366	5.187	1201.0	2.932	0.489	4921.6	4335.4
12-02-2014 15:32:27	15.722	4.959	962.9	2.897	0.461	5419.7	4588.6
12-02-2014 15:33:27	16.762	4.163	699.3	2.781	0.406	5814.9	5178.8
12-02-2014 15:34:27	17.070	3.901	642.4	2.665	0.319	5642.3	5178.7
12-02-2014 15:35:27	17.249	3.788	626.4	2.548	0.276	5919.0	5324.1
12-02-2014 15:36:27	17.182	3.821	642.5	2.442	0.293	5877.2	5663.0
12-02-2014 15:37:27	16.943	3.971	674.5	2.534	0.361	5910.9	5663.0
12-02-2014 15:38:27	16.246	4.443	807.4	2.548	0.344	5455.1	5530.8
12-02-2014 15:39:27	15.571	4.995	1077.3	2.428	0.424	4812.5	5218.6
12-02-2014 15:40:27	15.310	5.237	1206.6	2.768	0.441	4765.2	5218.5
12-02-2014 15:41:27	15.276	5.246	1265.1	2.904	0.493	4664.6	4939.1
12-02-2014 15:42:27	15.425	5.180	1126.5	3.042	0.483	5110.7	4285.8
12-02-2014 15:43:27	16.341	4.497	775.0	2.814	0.374	5676.4	4285.8
12-02-2014 15:44:27	17.018	3.972	656.8	2.721	0.402	5960.3	4725.6
12-02-2014 15:45:27	17.329	3.746	623.0	2.532	0.338	6036.7	5752.4
12-02-2014 15:46:27	17.177	3.822	635.2	2.495	0.333	5798.2	5752.4
12-02-2014 15:47:27	17.120	3.871	652.0	2.506	0.358	6028.2	5720.9
12-02-2014 15:48:27	16.365	4.350	781.4	2.542	0.383	5592.6	5647.3
12-02-2014 15:49:27	15.624	4.970	1007.6	2.441	0.414	5244.1	5647.2
12-02-2014 15:50:27	15.299	5.244	1230.1	2.637	0.440	4808.1	5289.7
12-02-2014 15:51:27	15.280	5.265	1239.0	2.946	0.450	4873.9	4455.0
12-02-2014 15:52:27	15.423	5.173	1112.6	2.944	0.458	5012.1	4455.1
12-02-2014 15:53:27	16.221	4.586	799.7	2.797	0.503	5736.3	4825.0
12-02-2014 15:54:27	16.894	4.061	678.7	2.778	0.367	5900.7	5687.7
12-02-2014 15:55:27	17.039	3.928	657.6	2.613	0.409	5946.3	5687.8
12-02-2014 15:56:27	17.015	3.933	659.7	2.562	0.453	5959.1	5679.0
12-02-2014 15:57:27	17.024	3.933	662.2	2.559	0.300	5990.1	5657.9
12-02-2014 15:58:27	16.907	4.002	686.0	2.538	0.328	5953.9	5657.9
12-02-2014 15:59:27	16.159	4.517	827.5	2.531	0.396	5518.0	5496.4
12-02-2014 16:00:27	15.514	5.049	1067.4	2.438	0.475	4884.2	5119.0
12-02-2014 16:01:28	15.159	5.335	1365.6	2.835	0.531	4609.3	5119.0
12-02-2014 16:02:26	15.194	5.323	1343.4	3.121	0.553	4603.5	4832.8
12-02-2014 16:03:26	15.699	5.003	987.4	3.002	0.449	5406.7	4081.1
12-02-2014 16:04:26	16.643	4.247	716.9	2.774	0.430	5779.2	4081.1
12-02-2014 16:05:26	17.127	3.891	648.6	2.688	0.387	5917.2	4508.1
12-02-2014 16:06:26	17.166	3.822	640.5	2.525	0.331	5814.9	5682.4
12-02-2014 16:07:26	17.200	3.839	636.5	2.556	0.334	6023.5	5682.4
12-02-2014 16:08:26	17.094	3.868	657.2	2.466	0.291	5935.1	5607.9
12-02-2014 16:09:26	16.283	4.420	797.0	2.565	0.328	5602.2	5402.8
12-02-2014 16:10:26	15.495	5.061	1105.3	2.384	0.420	4764.9	5402.8
12-02-2014 16:11:26	15.210	5.282	1348.0	2.897	0.509	4665.0	5202.0
12-02-2014 16:12:26	15.254	5.284	1285.9	2.985	0.514	4628.8	4649.9
12-02-2014 16:13:26	15.567	5.105	1051.2	2.988	0.445	5330.8	4649.9
12-02-2014 16:14:26	16.419	4.439	752.2	2.761	0.383	5813.8	4828.1
12-02-2014 16:15:26	17.044	3.955	658.7	2.702	0.384	5924.2	5318.3
12-02-2014 16:16:26	17.277	3.794	627.7	2.566	0.351	6027.5	5318.3
12-02-2014 16:17:26	17.262	3.782	633.2	2.474	0.314	6009.6	5398.2
12-02-2014 16:18:26	17.128	3.857	653.6	2.457	0.347	6042.3	5617.6
12-02-2014 16:19:26	16.299	4.409	792.1	2.553	0.373	5690.0	5617.6
12-02-2014 16:20:26	15.437	5.110	1124.5	2.416	0.454	4878.8	5341.1
12-02-2014 16:21:26	15.198	5.325	1296.7	2.824	0.552	4718.9	4580.1
12-02-2014 16:22:26	15.188	5.332	1341.8	3.025	0.534	4568.1	4580.2
12-02-2014 16:23:26	15.479	5.157	1099.7	3.068	0.441	5256.5	4517.9
12-02-2014 16:24:26	16.372	4.475	763.9	2.778	0.412	5768.4	4346.2
12-02-2014 16:25:26	17.023	3.976	661.9	2.745	0.366	5976.0	4346.3
12-02-2014 16:26:26	17.245	3.793	625.1	2.544	0.330	5839.6	4552.6
12-02-2014 16:27:26	17.242	3.793	632.3	2.481	0.323	6116.7	5119.6
12-02-2014 16:28:26	17.181	3.829	646.4	2.508	0.300	6144.3	5119.9
12-02-2014 16:29:26	16.478	4.276	760.7	2.573	0.309	5773.8	5227.7
12-02-2014 16:30:26	15.554	5.019	1036.3	2.464	0.354	4946.8	5524.0
12-02-2014 16:31:26	15.257	5.294	1273.7	2.779	0.371	4753.8	5524.0

12-02-2014 16:32:26	15.226	5.312	1304.6	2.938	0.412	4727.5	5107.5
12-02-2014 16:33:26	15.399	5.207	1147.5	3.023	0.374	5007.3	3962.1
12-02-2014 16:34:26	16.182	4.632	813.0	2.818	0.344	5639.4	3962.1
12-02-2014 16:35:26	16.927	4.042	671.6	2.777	0.257	5844.6	4411.8
12-02-2014 16:36:26	17.249	3.814	631.1	2.598	0.235	5917.9	5648.7
12-02-2014 16:37:26	17.255	3.794	633.6	2.494	0.200	5898.6	5648.5
12-02-2014 16:38:26	17.192	3.832	639.4	2.470	0.213	5696.8	5607.3
12-02-2014 16:39:26	16.615	4.178	731.5	2.572	0.212	5590.1	5493.8
12-02-2014 16:40:26	15.687	4.913	989.7	2.497	0.225	4911.8	5493.8
12-02-2014 16:41:26	15.196	5.332	1305.4	2.706	0.303	4544.7	5209.0
12-02-2014 16:42:26	15.203	5.333	1326.3	3.052	0.305	4643.9	4425.8
12-02-2014 16:43:26	15.319	5.263	1213.3	3.091	0.314	4755.2	4425.8
12-02-2014 16:44:26	16.073	4.738	835.1	2.822	0.256	5565.1	4523.0
12-02-2014 16:45:26	16.892	4.079	679.6	2.775	0.117	5868.3	4790.2
12-02-2014 16:46:26	17.292	3.790	623.6	2.566	0.194	5927.7	4790.0
12-02-2014 16:47:26	17.337	3.738	615.2	2.428	0.180	5869.6	5012.3
12-02-2014 16:48:26	17.196	3.825	636.0	2.504	0.141	5960.8	5623.1
12-02-2014 16:49:26	16.680	4.143	719.4	2.554	0.122	5836.1	5623.0
12-02-2014 16:50:26	15.776	4.846	960.3	2.417	0.194	5345.0	5532.5
12-02-2014 16:51:26	15.221	5.310	1290.2	2.554	0.246	4600.4	5283.6
12-02-2014 16:52:26	15.145	5.375	1399.7	3.050	0.319	4716.8	5283.5
12-02-2014 16:53:26	15.220	5.323	1315.7	3.088	0.352	4651.5	5057.5
12-02-2014 16:54:26	15.923	4.855	881.0	2.933	0.278	5392.5	4435.7
12-02-2014 16:55:26	16.845	4.125	682.7	2.760	0.191	5921.2	4435.7
12-02-2014 16:56:26	17.307	3.779	626.3	2.559	0.176	6082.0	4775.1
12-02-2014 16:57:26	17.308	3.753	621.8	2.423	0.109	5992.0	5708.0
12-02-2014 16:58:26	17.185	3.830	635.7	2.454	0.156	5852.2	5708.1
12-02-2014 16:59:26	16.799	4.068	701.7	2.541	0.153	5989.6	5680.2
12-02-2014 17:00:26	15.926	4.714	911.2	2.481	0.163	5427.6	5603.4
12-02-2014 17:01:26	15.268	5.269	1254.5	2.567	0.240	4655.7	5603.3
12-02-2014 17:02:26	15.147	5.370	1371.6	3.034	0.244	4562.5	5302.7
12-02-2014 17:03:26	15.277	5.300	1280.1	3.042	0.242	4850.1	4475.7
12-02-2014 17:04:26	15.860	4.889	922.5	2.874	0.233	5539.9	4475.6
12-02-2014 17:05:26	16.771	4.177	696.4	2.740	0.093	5777.3	4735.2

Test Run 2 STRATA Version 3.2

	O2	CO2	CO	NOx	SO2	THC	CH4
	%	%	ppm	ppm	ppm	ppm	ppm
12-02-2014 17:06:26	17.087	3.916	645.7	2.659	0.099	5736.1	5448.8
12-02-2014 17:07:26	17.228	3.825	631.2	2.524	0.059	6015.1	5448.8
12-02-2014 17:08:26	17.260	3.803	628.5	2.474	0.049	6063.0	5564.5
12-02-2014 17:09:26	17.094	3.884	662.7	2.425	0.042	6015.9	5882.6
12-02-2014 17:10:26	16.197	4.509	822.5	2.491	0.114	5610.6	5882.6
12-02-2014 17:11:26	15.385	5.160	1165.5	2.424	0.154	4757.5	5496.8
12-02-2014 17:12:26	15.110	5.397	1416.4	2.974	0.212	4436.5	4435.7
12-02-2014 17:13:26	15.165	5.362	1349.8	3.157	0.247	4632.9	4435.7
12-02-2014 17:14:26	15.628	5.074	1033.9	2.959	0.251	5364.2	4471.5
12-02-2014 17:15:26	16.546	4.353	740.0	2.725	0.190	6005.7	4570.0
12-02-2014 17:16:26	17.052	3.956	654.6	2.675	0.051	5799.3	4569.9
12-02-2014 17:17:26	17.154	3.865	637.4	2.575	0.109	5852.4	4776.1
12-02-2014 17:18:26	17.227	3.830	639.4	2.474	0.071	6171.5	5343.1
12-02-2014 17:19:26	17.169	3.861	653.1	2.407	0.142	6110.2	5343.1
12-02-2014 17:20:26	16.449	4.318	772.7	2.523	0.130	5754.8	5391.0
12-02-2014 17:21:26	15.631	4.990	997.9	2.425	0.196	5146.5	5508.2
12-02-2014 17:22:26	15.306	5.264	1236.6	2.577	0.277	4907.5	5508.2
12-02-2014 17:23:26	15.161	5.368	1370.7	2.940	0.285	4625.2	5123.8
12-02-2014 17:24:26	15.340	5.277	1195.7	3.025	0.255	5078.3	4066.1
12-02-2014 17:25:26	16.227	4.621	798.2	2.808	0.211	5747.1	4066.0
12-02-2014 17:26:26	16.981	4.032	667.5	2.757	0.094	6002.3	4534.4
12-02-2014 17:27:26	17.164	3.865	638.8	2.551	0.105	6023.8	5822.3
12-02-2014 17:28:26	17.318	3.768	621.9	2.456	0.078	6099.8	5822.3
12-02-2014 17:29:26	17.250	3.802	638.0	2.407	0.058	6136.6	5857.0
12-02-2014 17:30:26	16.644	4.158	742.9	2.490	0.085	5892.3	5952.2
12-02-2014 17:31:26	15.699	4.949	986.9	2.425	0.187	5313.6	5952.4
12-02-2014 17:32:26	15.171	5.345	1342.2	2.600	0.225	4612.7	5546.7
12-02-2014 17:33:26	15.175	5.371	1354.5	3.081	0.226	4762.0	4430.9
12-02-2014 17:34:26	15.288	5.298	1272.3	3.054	0.304	5019.7	4430.9
12-02-2014 17:35:26	16.052	4.779	861.4	2.813	0.170	5684.6	4658.0
12-02-2014 17:36:26	16.817	4.132	691.7	2.691	0.110	5922.7	5278.4
12-02-2014 17:37:26	17.192	3.873	635.2	2.601	0.118	5888.6	5278.3
12-02-2014 17:38:26	17.266	3.796	625.0	2.506	0.171	6067.4	5331.4
12-02-2014 17:39:26	17.273	3.778	634.3	2.421	0.113	6084.7	5458.3
12-02-2014 17:40:26	16.773	4.093	707.3	2.483	0.124	5917.4	5458.3
12-02-2014 17:41:26	15.892	4.762	908.4	2.484	0.159	5375.5	5338.6
12-02-2014 17:42:26	15.322	5.249	1204.1	2.485	0.251	4968.3	5009.5
12-02-2014 17:43:26	15.179	5.361	1384.9	2.822	0.274	4674.1	5009.5
12-02-2014 17:44:26	15.317	5.282	1221.7	2.985	0.277	5019.3	4777.9
12-02-2014 17:45:26	15.743	4.987	948.9	2.817	0.246	5501.0	4141.1
12-02-2014 17:46:26	16.696	4.250	711.5	2.725	0.226	5909.1	4141.1
12-02-2014 17:47:26	17.170	3.874	638.9	2.601	0.128	6023.4	4513.7
12-02-2014 17:48:26	17.297	3.790	623.1	2.455	0.123	6033.8	5538.3
12-02-2014 17:49:26	17.240	3.810	635.3	2.412	0.143	6105.9	5538.3
12-02-2014 17:50:26	16.834	4.052	694.6	2.510	0.132	5834.4	5463.8
12-02-2014 17:51:26	15.877	4.759	916.4	2.485	0.190	5258.1	5259.0
12-02-2014 17:52:26	15.307	5.266	1188.7	2.519	0.245	5011.4	5259.0
12-02-2014 17:53:26	15.237	5.330	1311.8	2.800	0.219	4595.3	4889.7
12-02-2014 17:54:26	15.242	5.333	1285.4	2.988	0.243	4935.7	3951.3
12-02-2014 17:55:26	15.700	5.033	964.4	2.851	0.273	5448.7	3951.3
12-02-2014 17:56:26	16.639	4.293	722.4	2.690	0.151	5860.7	4403.3
12-02-2014 17:57:26	17.062	3.948	655.0	2.654	0.059	5982.4	5473.2
12-02-2014 17:58:26	17.245	3.832	627.4	2.484	0.065	5967.3	5473.2
12-02-2014 17:59:26	17.268	3.813	633.5	2.407	0.073	6055.3	5574.6
12-02-2014 18:00:26	16.964	3.975	676.9	2.460	0.154	6016.2	5852.5
12-02-2014 18:01:26	16.092	4.595	840.0	2.467	0.145	5440.0	5852.7
12-02-2014 18:02:26	15.348	5.216	1195.8	2.389	0.219	4843.5	5565.4
12-02-2014 18:03:26	15.138	5.400	1387.7	2.848	0.261	4632.8	4775.3
12-02-2014 18:04:26	15.209	5.353	1316.9	2.996	0.359	4673.4	4775.3
12-02-2014 18:05:26	15.593	5.115	1029.0	2.954	0.246	5366.7	4901.6
12-02-2014 18:06:26	16.517	4.381	739.7	2.695	0.174	5786.7	5248.9
12-02-2014 18:07:26	16.996	4.009	658.0	2.649	0.178	5875.2	5248.8
Run Averages	O2	CO2	CO	NOx	SO2	THC	CH4
	%	%	ppm	ppm	ppm	ppm	ppm
12-02-2014 18:07:26	16.264	4.524	898.1	2.668	0.290	5468.1	5114.1

Operator: Sean MacKay
Plant Name: L&RR Landfill Flare
Location: Stack
Test Run 2 End

Reference Cylinder Numbers
Zero Span

Run 2 final System Bias

O2
CO2
CO
NOx
SO2
THC
CH4

Date/Time	12-02-2014		18:18:39		PASSED		
Analyte	O2	CO2	CO	NOx	SO2	THC	CH4
Units	%	%	ppm	ppm	ppm	ppm	ppm
Zero Ref Cyl	0.000	0.000	0.0	0.000	0.000	0.0	0.0
Zero Cal	0.004	0.002	0.1	0.106	0.546	0.0	0.0
Zero Avg	0.047	0.089	0.2	0.306	-0.189	0.0	0.0
Zero Bias%	0.2%	0.4%	0.0%	0.2%	0.8%	0.0%	0.0%
Zero Drift%	0.1%	0.1%	0.0%	-0.1%	0.5%	0.0%	0.0%
Span Ref Cyl	11.340	9.860	47.0	53.100	48.600	0.0	0.0
Span Cal	11.476	9.904	47.9	53.864	48.349	0.0	0.0
Span Avg	11.395	10.141	46.3	50.906	47.343	0.0	0.0
Span Bias%	0.4%	1.2%	0.1%	3.1%	1.1%	0.0%	0.0%
Span Drift%	-0.2%	0.1%	0.0%	-2.7%	1.2%	0.0%	0.0%
Ini Zero Avg	0.030	0.067	0.2	0.409	-0.708	0.0	0.0
Ini Span Avg	11.436	10.114	46.3	53.511	46.216	0.0	0.0
Run Avg	16.264	4.524	898.1	2.668	0.290	5468.1	5114.1
Co	0.039	0.078	0.2	0.357	-0.448	0.0	0.0
Cm	11.416	10.127	46.3	52.208	46.779	0.0	0.0
Correct Avg	16.173	4.363	915.9	2.366	0.759	0.0	0.0

System Bias Check End

Calibration Error Test, Run 3 STRATA Version 3.2
Operator: Sean MacKay
Plant Name: L&RR Landfill Flare
Location: Stack

Reference Cylinder Numbers

	Zero	Low-range	Mid-range	High-range
O2				
CO2				
CO				
NOx				
SO2				
THC				
CH4				

Date/Time 12-03-2014 08:27:10 PASSED

Analyte	O2	CO2	CO	NOx	SO2	THC	CH4
Units	%	%	ppm	ppm	ppm	ppm	ppm
Zero Ref Cyl	0.000	0.000	0.0	0.000	0.000		
Zero Avg	0.028	0.111	0.3	0.211	0.912		
Zero Error%	0.1%	0.6%	0.0%	0.2%	1.0%		
Low Ref Cyl							
Low Avg							
Low Error%							
Mid Ref Cyl	11.340	9.860	1006.0	53.100	48.600		
Mid Avg	11.294	9.912	1003.8	53.163	48.337		
Mid Error%	0.2%	0.3%	0.1%	0.1%	0.3%		
High Ref Cyl	22.700	19.850	1944.0	94.870	94.500		
High Avg	22.624	19.653	1960.9	95.692	95.344		
High Error%	0.3%	1.0%	0.9%	0.9%	0.9%		

Calibration Error Test End

Test Run 3 STRATA Version 3.2

	O2	CO2	CO	NOx	SO2	THC	CH4
	%	%	ppm	ppm	ppm	ppm	ppm
Begin calculating run averages							
12-03-2014 08:31:29	20.929	0.099	0.2	48.730	4.294	5772.4	5828.7
12-03-2014 08:32:29	20.933	0.099	0.2	48.651	3.757	5770.4	5829.0
Run Averages	O2	CO2	CO	NOx	SO2	THC	CH4
	%	%	ppm	ppm	ppm	ppm	ppm
12-03-2014 08:32:31	20.931	0.099	0.2	48.689	4.023	5772.6	5828.8

Operator: Sean MacKay
Plant Name: L&RR Landfill Flare
Location: Stack
Test Run 3 End

NO4 Converter Eff

$NO_2 = 48.3$ ppm

$$Eff = 1 - \frac{48.3 - 48.7}{48.3} \times 100 = 100^{+}$$

Initial System Bias Check, Run 3 STRATA Version 3.2
Operator: Sean MacKay
Plant Name: L&RR Landfill Flare
Location: Stack

Reference Cylinder Numbers

	Zero	Span
O2		
CO2		
CO		
NOx		
SO2		
THC		
CH4		

Date/Time 12-03-2014 08:46:42 PASSED

Analyte	O2	CO2	CO	NOx	SO2	THC	CH4
Units	%	%	ppm	ppm	ppm	ppm	ppm
Zero Ref Cyl	0.000	0.000	0.0	0.000	0.000	0.0	0.0
Zero Cal	0.028	0.111	0.3	0.211	0.912	0.0	0.0
Zero Avg	0.067	0.108	0.3	0.635	0.934	0.0	0.0
Zero Bias%	0.2%	0.0%	0.0%	0.4%	0.0%	0.0%	0.0%
Zero Drift%							
Span Ref Cyl	11.340	9.860	1006.0	53.100	48.600	0.0	0.0
Span Cal	11.294	9.912	1003.8	53.163	48.337	0.0	0.0
Span Avg	11.302	9.850	994.3	52.360	50.250	0.0	0.0
Span Bias%	0.0%	0.3%	0.5%	0.8%	2.0%	0.0%	0.0%
Span Drift%							

System Bias Check End

Test Run 3 STRATA Version 3.2

	O2 %	CO2 %	CO ppm	NOx ppm	SO2 ppm	THC ppm	CH4 ppm
Begin calculating run averages							
12-03-2014 09:01:55	17.106	3.630	611.4	2.684	0.785	4871.6	5337.9
12-03-2014 09:02:55	16.792	3.806	673.9	2.666	0.831	4839.2	5342.0
12-03-2014 09:03:55	16.029	4.357	828.3	2.749	0.839	4684.5	5358.2
12-03-2014 09:04:55	15.437	4.840	1034.8	2.650	0.856	4286.0	5358.3
12-03-2014 09:05:55	15.167	5.064	1213.2	2.895	0.856	4087.3	5143.6
12-03-2014 09:06:55	15.194	5.048	1195.4	3.058	0.877	4221.4	4284.9
12-03-2014 09:07:55	15.665	4.755	968.8	3.043	0.850	4614.6	4284.9
12-03-2014 09:08:55	16.512	4.091	716.1	2.979	0.783	4763.4	4484.6
12-03-2014 09:09:55	17.044	3.695	618.0	2.846	0.668	4904.5	5283.4
12-03-2014 09:10:55	17.086	3.649	611.5	2.716	0.612	4878.8	5283.4
12-03-2014 09:11:55	17.108	3.641	609.9	2.640	0.609	4851.7	5322.6
12-03-2014 09:12:55	16.715	3.866	687.5	2.645	0.595	4909.7	5478.6
12-03-2014 09:13:55	15.980	4.419	841.9	2.691	0.610	4720.3	5478.7
12-03-2014 09:14:55	15.343	4.930	1079.5	2.622	0.666	4208.4	5249.1
12-03-2014 09:15:55	15.234	5.050	1163.4	2.876	0.624	4253.6	4330.0
12-03-2014 09:16:55	15.217	5.060	1205.0	2.970	0.617	4136.8	4330.0
12-03-2014 09:17:55	15.613	4.816	993.1	2.969	0.610	4566.2	4428.9
12-03-2014 09:18:55	16.509	4.113	730.8	2.936	0.482	4907.8	4824.5
12-03-2014 09:19:55	17.035	3.721	628.6	2.809	0.481	4772.5	4824.4
12-03-2014 09:20:55	17.138	3.637	610.7	2.655	0.484	4834.6	4962.2
12-03-2014 09:21:55	17.114	3.652	618.4	2.616	0.422	4952.7	5513.2
12-03-2014 09:22:55	16.843	3.813	674.1	2.629	0.342	5111.3	5513.2
12-03-2014 09:23:55	15.997	4.421	834.6	2.685	0.430	4849.3	5507.2
12-03-2014 09:24:55	15.277	4.995	1125.1	2.548	0.482	4287.6	5483.0
12-03-2014 09:25:55	14.913	5.278	1440.0	3.175	0.583	3749.3	5483.0
12-03-2014 09:26:55	14.930	5.261	1432.9	3.409	0.573	3890.9	5315.3
12-03-2014 09:27:55	15.596	4.863	992.2	3.196	0.566	4697.4	4644.2
12-03-2014 09:28:55	16.523	4.117	729.0	2.916	0.512	4839.6	4644.2
12-03-2014 09:29:55	17.088	3.690	620.5	2.769	0.413	4876.8	4781.8
Pause							
End Pause							
12-03-2014 09:32:55	16.881	3.783	662.5	2.626	0.452	4969.4	5425.5
12-03-2014 09:33:55	16.107	4.335	806.4	2.731	0.470	4728.4	5796.9
12-03-2014 09:34:55	15.408	4.903	1043.6	2.649	0.525	4390.8	5796.9
12-03-2014 09:35:55	15.186	5.100	1186.5	2.823	0.558	4357.9	5542.3
12-03-2014 09:36:55	15.216	5.083	1171.7	2.983	0.612	4268.2	4523.9
12-03-2014 09:37:55	15.399	4.973	1065.2	3.046	0.516	4571.3	4523.9
12-03-2014 09:38:55	16.213	4.355	780.5	2.926	0.458	4693.8	4615.8
12-03-2014 09:39:55	16.926	3.810	638.4	2.887	0.509	4837.3	4983.5
12-03-2014 09:40:55	17.052	3.694	618.3	2.733	0.420	4928.3	4983.2
12-03-2014 09:41:55	17.088	3.671	617.3	2.650	0.375	4980.7	5033.7
12-03-2014 09:42:55	16.955	3.750	648.8	2.615	0.352	5077.4	5237.4
12-03-2014 09:43:55	16.273	4.201	773.9	2.711	0.360	5014.1	5237.2
12-03-2014 09:44:55	15.568	4.779	964.8	2.620	0.424	4646.1	5241.3
12-03-2014 09:45:55	15.191	5.095	1176.4	2.733	0.487	4249.5	5257.3
12-03-2014 09:46:55	15.143	5.131	1225.3	3.072	0.515	4217.4	5257.4
12-03-2014 09:47:55	15.302	5.037	1128.0	3.097	0.432	4517.0	5163.4
12-03-2014 09:48:55	16.088	4.467	812.5	2.950	0.425	4930.6	4787.8
12-03-2014 09:49:55	16.862	3.864	659.8	2.920	0.423	5039.2	4788.2
12-03-2014 09:50:55	17.106	3.652	614.5	2.721	0.375	5021.4	4895.0
12-03-2014 09:51:55	17.102	3.660	618.1	2.649	0.388	5064.4	5322.1
12-03-2014 09:52:55	17.000	3.717	635.2	2.616	0.343	5096.1	5322.1
12-03-2014 09:53:55	16.439	4.075	738.6	2.697	0.374	5108.7	5367.1
12-03-2014 09:54:55	15.683	4.681	928.4	2.635	0.335	4628.3	5546.8
12-03-2014 09:55:55	15.144	5.098	1208.0	2.771	0.371	4159.4	5546.8
12-03-2014 09:56:55	15.093	5.155	1250.5	3.076	0.404	4115.4	5333.2
12-03-2014 09:57:55	15.225	5.077	1188.3	3.177	0.426	4296.8	4478.4
12-03-2014 09:58:55	15.994	4.539	839.8	3.014	0.398	4997.5	4478.3
12-03-2014 09:59:55	16.795	3.902	664.7	2.928	0.294	4994.7	4640.4
12-03-2014 10:00:55	17.059	3.679	608.9	2.730	0.262	4952.6	5287.2
12-03-2014 10:01:55	17.096	3.660	608.1	2.665	0.325	5027.3	5287.2
12-03-2014 10:02:55	17.019	3.705	624.7	2.615	0.291	4933.0	5290.1
12-03-2014 10:03:55	16.437	4.056	729.5	2.696	0.262	4906.9	5301.8

Run Averages	O2 %	CO2 %	CO ppm	NOx ppm	SO2 ppm	THC ppm	CH4 ppm
12-03-2014 10:04:31	16.174	4.339	862.0	2.815	0.509	4677.6	5095.3

Operator: Sean MacKay
Plant Name: L&RR Landfill Flare
Location: Stack
Test Run 3 End

CEM RUN 1 & START

Final System Bias Check, Run 3 STRATA Version 3.2
Operator: Sean MacKay
Plant Name: L&RR Landfill Flare
Location: Stack

CEM Run 1

Reference Cylinder Numbers
Zero Span
O2
CO2
CO
NOx
SO2
THC
CH4

Date/Time 12-03-2014 10:11:38 PASSED

Analyte	O2	CO2	CO	NOx	SO2	THC	CH4
Units	%	%	ppm	ppm	ppm	ppm	ppm
Zero Ref Cyl	0.000	0.000	0.0	0.000	0.000	0.0	0.0
Zero Cal	0.028	0.111	0.3	0.211	0.912	0.0	0.0
Zero Avg	0.075	0.143	0.2	0.309	0.690	0.0	0.0
Zero Bias%	0.2%	0.2%	0.0%	0.1%	0.2%	0.0%	0.0%
Zero Drift%	0.0%	0.2%	0.0%	-0.3%	-0.3%	0.0%	0.0%
Span Ref Cyl	11.340	9.860	1006.0	53.100	48.600	0.0	0.0
Span Cal	11.294	9.912	1003.8	53.163	48.337	0.0	0.0
Span Avg	11.310	9.980	985.8	53.212	48.181	0.0	0.0
Span Bias%	0.1%	0.3%	0.9%	0.1%	0.2%	0.0%	0.0%
Span Drift%	0.0%	0.7%	-0.4%	0.9%	-2.2%	0.0%	0.0%
Ini Zero Avg	0.067	0.108	0.3	0.635	0.934	0.0	0.0
Ini Span Avg	11.302	9.850	994.3	52.360	50.250	0.0	0.0
Run Avg	16.174	4.339	862.0	2.815	0.509	4677.6	5095.3
Co	0.071	0.126	0.3	0.472	0.812	0.0	0.0
Cm	11.306	9.915	990.0	52.786	49.216	0.0	0.0
Correct Avg	16.254	4.244	875.8	2.378	-0.304	0.0	0.0

System Bias Check End

Run Run 2

Test Run 4 STRATA Version 3.2

	O2	CO2	CO	NOx	SO2	THC	CH4
	%	%	ppm	ppm	ppm	ppm	ppm
Begin calculating run averages							
12-03-2014 10:15:44	15.608	4.720	947.0	2.636	1.453	4622.2	5529.8
12-03-2014 10:16:44	15.283	5.006	1102.6	2.598	1.142	4279.0	5531.0
12-03-2014 10:17:44	15.214	5.040	1158.9	2.962	0.954	4244.0	5489.6
12-03-2014 10:18:44	15.341	4.989	1094.0	2.949	0.731	4506.3	4288.4
12-03-2014 10:19:44	16.011	4.507	831.7	2.931	0.573	4772.3	4288.4
12-03-2014 10:20:44	16.709	3.939	675.8	2.929	0.390	4745.2	4314.1
12-03-2014 10:21:44	16.999	3.712	621.9	2.814	0.291	4810.2	5057.4
12-03-2014 10:22:44	16.996	3.719	625.9	2.714	0.245	4877.0	5057.5
12-03-2014 10:23:44	16.968	3.733	633.9	2.647	0.227	4907.2	5081.5
12-03-2014 10:24:44	16.556	3.974	711.5	2.698	0.183	4900.7	5771.2
12-03-2014 10:25:44	15.859	4.519	871.6	2.682	0.263	4770.2	5771.2
12-03-2014 10:26:44	15.364	4.935	1055.5	2.580	0.237	4385.6	5750.6
12-03-2014 10:27:44	15.305	4.997	1098.2	2.714	0.215	4538.7	5152.3
12-03-2014 10:28:44	15.275	5.026	1146.9	2.814	0.249	4440.2	5152.3
12-03-2014 10:29:44	15.637	4.789	950.8	2.912	0.298	4671.4	5144.8
12-03-2014 10:30:44	16.497	4.104	725.3	2.897	0.211	4906.6	4927.9
12-03-2014 10:31:44	16.945	3.775	638.4	2.814	0.188	4904.7	4927.9
12-03-2014 10:32:44	17.036	3.689	620.3	2.663	0.110	4864.3	4940.2
12-03-2014 10:33:44	16.942	3.744	636.6	2.598	0.152	4990.7	5297.2
12-03-2014 10:34:44	16.684	3.894	689.9	2.648	0.103	5045.8	5297.0
12-03-2014 10:35:44	15.992	4.414	841.1	2.714	0.081	4927.5	5304.1
12-03-2014 10:36:44	15.524	4.813	998.3	2.532	0.107	4528.3	5502.1
12-03-2014 10:37:44	15.280	5.009	1113.4	2.747	0.136	4394.0	5502.2
12-03-2014 10:38:44	15.266	5.022	1154.8	2.913	0.098	4379.2	5478.4
12-03-2014 10:39:44	15.442	4.934	1047.6	2.878	0.103	4636.6	4783.0
12-03-2014 10:40:44	16.340	4.224	745.8	2.883	0.080	4661.9	4782.9
12-03-2014 10:41:44	16.883	3.798	638.1	2.845	0.071	4787.7	4806.6
12-03-2014 10:42:44	16.975	3.735	627.5	2.734	0.054	4886.6	5496.7
12-03-2014 10:43:44	16.968	3.732	633.9	2.649	-0.015	4899.8	5496.7
12-03-2014 10:44:44	16.882	3.774	644.2	2.677	0.057	4942.7	5495.4
12-03-2014 10:45:44	16.314	4.158	758.3	2.681	0.072	4867.8	5456.7
12-03-2014 10:46:44	15.659	4.687	928.0	2.612	0.020	4581.2	5456.7
12-03-2014 10:47:44	15.372	4.950	1053.7	2.602	0.040	4569.8	5441.5
12-03-2014 10:48:44	15.285	5.016	1113.1	2.785	0.055	4586.3	5002.4
12-03-2014 10:49:44	15.403	4.928	1065.7	2.899	0.099	4483.5	5002.3
12-03-2014 10:50:44	15.728	4.718	927.3	2.864	0.024	4839.7	5013.5
12-03-2014 10:51:44	16.533	4.070	703.8	2.932	-0.019	4773.0	5336.4
12-03-2014 10:52:44	16.968	3.745	631.4	2.807	-0.059	4940.7	5336.4
12-03-2014 10:53:44	16.886	3.780	641.5	2.712	-0.029	4888.3	5337.7
12-03-2014 10:54:44	16.855	3.800	641.3	2.710	-0.072	4927.8	5376.4
12-03-2014 10:55:44	16.729	3.870	680.2	2.668	-0.095	4913.1	5376.4
12-03-2014 10:56:44	16.070	4.341	810.5	2.713	0.001	4896.0	5388.0
12-03-2014 10:57:44	15.506	4.809	989.7	2.594	-0.029	4702.3	5726.2
12-03-2014 10:58:44	15.244	5.037	1127.0	2.736	0.033	4552.2	5726.2
12-03-2014 10:59:44	15.163	5.082	1222.1	2.887	0.032	4433.6	5686.4
12-03-2014 11:00:44	15.470	4.913	1042.9	3.084	0.038	4649.0	4533.1
12-03-2014 11:01:44	16.410	4.190	741.9	2.916	-0.019	4972.1	4533.1
12-03-2014 11:02:44	16.896	3.794	645.6	2.854	-0.055	4888.4	4558.4
12-03-2014 11:03:44	16.971	3.734	633.2	2.713	-0.079	4991.1	5291.7
12-03-2014 11:04:44	16.896	3.761	641.2	2.664	-0.056	4960.2	5291.7
12-03-2014 11:05:44	16.780	3.841	667.1	2.679	-0.073	5083.7	5298.8
12-03-2014 11:06:44	16.165	4.259	788.3	2.730	-0.030	4961.4	5506.5
12-03-2014 11:07:44	15.600	4.734	959.4	2.575	-0.017	4696.1	5506.5
12-03-2014 11:08:44	15.345	4.969	1077.4	2.736	0.065	4575.8	5496.7
12-03-2014 11:09:44	15.125	5.094	1241.9	2.837	0.094	4242.4	5211.7
12-03-2014 11:10:44	15.244	5.049	1146.1	3.112	0.054	4448.7	5211.7
12-03-2014 11:11:44	16.081	4.451	817.7	2.915	0.010	4942.0	5214.8
12-03-2014 11:12:44	16.857	3.828	651.3	2.909	-0.030	4862.6	5306.2
12-03-2014 11:13:44	16.987	3.707	624.5	2.742	0.027	4925.8	5306.2
12-03-2014 11:14:44	17.023	3.705	615.1	2.694	-0.118	4845.2	5311.4

Run Averages	O2	CO2	CO	NOx	SO2	THC	CH4
	%	%	ppm	ppm	ppm	ppm	ppm
12-03-2014 11:14:44	16.139	4.355	847.9	2.769	0.148	4737.0	5227.8

Operator: Sean MacKay
Plant Name: L&RR Landfill Flare
Location: Stack
Test Run 4 End

CEM Run 2

Final System Bias Check, Run 4 STRATA Version 3.2
Operator: Sean MacKay
Plant Name: L&RR Landfill Flare
Location: Stack

Reference Cylinder Numbers
Zero Span

O2
CO2
CO
NOx
SO2
THC
CH4

Date/Time 12-03-2014 11:23:12 PASSED

Analyte	O2	CO2	CO	NOx	SO2	THC	CH4
Units	%	%	ppm	ppm	ppm	ppm	ppm
Zero Ref Cyl	0.000	0.000	0.0	0.000	0.000	0.0	0.0
Zero Cal	0.028	0.111	0.3	0.211	0.912	0.0	0.0
Zero Avg	0.091	0.150	0.2	0.510	-0.177	0.0	0.0
Zero Bias%	0.3%	0.2%	0.0%	0.3%	1.2%	0.0%	0.0%
Zero Drift%	0.1%	0.0%	0.0%	0.2%	-0.9%	0.0%	0.0%
Span Ref Cyl	11.340	9.860	1006.0	53.100	48.600	0.0	0.0
Span Cal	11.294	9.912	1003.8	53.163	48.337	0.0	0.0
Span Avg	11.264	9.969	985.8	51.065	47.397	0.0	0.0
Span Bias%	0.1%	0.3%	0.9%	2.2%	1.0%	0.0%	0.0%
Span Drift%	-0.2%	-0.1%	0.0%	-2.3%	-0.8%	0.0%	0.0%
Ini Zero Avg	0.075	0.143	0.2	0.309	0.690	0.0	0.0
Ini Span Avg	11.310	9.980	985.8	53.212	48.181	0.0	0.0
Run Avg	16.139	4.355	847.9	2.769	0.148	4737.0	5227.8
Co	0.083	0.146	0.2	0.410	0.256	0.0	0.0
Cm	11.287	9.974	985.8	52.139	47.789	0.0	0.0
Correct Avg	16.251	4.222	865.2	2.422	-0.110	0.0	0.0

System Bias Check End

CEM RUN 3

Test Run 5 STRATA Version 3.2

	O2	CO2	CO	NOx	SO2	THC	CH4
	%	%	ppm	ppm	ppm	ppm	ppm
Begin calculating run averages							
12-03-2014 11:26:26	16.370	4.085	746.4	2.734	1.616	5090.5	228.0
12-03-2014 11:27:26	15.773	4.575	897.9	2.603	0.991	4795.9	4282.4
12-03-2014 11:28:26	15.250	4.983	1128.7	2.580	0.726	4391.8	5760.1
12-03-2014 11:29:26	15.130	5.094	1247.6	2.788	0.639	4276.1	5760.4
12-03-2014 11:30:26	15.066	5.152	1270.8	3.088	0.566	4508.2	4310.9
12-03-2014 11:31:26	15.909	4.580	859.1	2.981	0.342	4780.3	3783.4
12-03-2014 11:32:26	16.738	3.909	663.7	2.942	0.135	4905.3	3783.4
12-03-2014 11:33:26	16.985	3.701	619.0	2.759	0.094	4878.5	4947.8
12-03-2014 11:34:26	17.055	3.643	608.8	2.662	0.009	4896.7	5371.3
12-03-2014 11:35:26	16.978	3.699	624.1	2.628	-0.031	4884.0	5371.3
12-03-2014 11:36:26	16.447	4.021	733.8	2.675	0.002	4902.1	5499.6
12-03-2014 11:37:26	15.676	4.628	945.7	2.628	0.011	4649.4	5546.3
12-03-2014 11:38:26	15.210	5.046	1167.1	2.725	0.054	4543.6	5546.4
12-03-2014 11:39:26	15.128	5.096	1218.3	2.866	0.136	4453.1	4734.0
12-03-2014 11:40:26	15.163	5.079	1193.0	3.061	0.105	4319.4	4438.5
12-03-2014 11:41:26	15.899	4.563	860.1	2.989	0.088	4741.0	4438.5
12-03-2014 11:42:26	16.721	3.929	664.4	2.904	-0.062	4832.3	4874.0
12-03-2014 11:43:26	17.026	3.668	609.3	2.736	-0.104	4801.5	5032.3
12-03-2014 11:44:26	17.051	3.644	605.9	2.670	-0.062	4840.3	5032.4
12-03-2014 11:45:26	16.982	3.697	620.9	2.648	-0.006	4928.4	5120.2
12-03-2014 11:46:26	16.444	4.026	733.8	2.642	-0.001	5066.1	5152.0
12-03-2014 11:47:26	15.681	4.648	913.8	2.626	-0.028	4623.5	5152.3
12-03-2014 11:48:26	15.202	5.032	1144.5	2.694	0.000	4460.2	4800.6
12-03-2014 11:49:26	15.130	5.107	1245.9	2.949	-0.015	4268.3	4672.7
12-03-2014 11:50:26	15.258	5.031	1139.0	3.107	0.016	4670.5	4672.7
12-03-2014 11:51:26	15.977	4.507	838.7	2.893	0.011	4909.8	5371.9
12-03-2014 11:52:26	16.761	3.891	668.1	2.904	-0.069	4966.2	5626.6
12-03-2014 11:53:26	16.862	3.779	634.2	2.794	-0.083	4840.2	5626.6
12-03-2014 11:54:26	16.872	3.773	639.7	2.704	-0.124	4923.7	5681.3
12-03-2014 11:55:26	16.796	3.822	652.0	2.714	-0.173	4806.5	5701.2
12-03-2014 11:56:26	16.510	3.992	702.9	2.788	-0.166	4760.9	5701.3
12-03-2014 11:57:26	15.887	4.481	849.9	2.710	-0.116	4769.1	5419.1
12-03-2014 11:58:26	15.492	4.803	994.1	2.626	-0.150	4521.1	5316.4
12-03-2014 11:59:26	15.400	4.893	1029.1	2.740	-0.069	4591.4	5316.4
12-03-2014 12:00:26	15.451	4.877	1020.4	2.733	-0.018	4685.6	5038.7
12-03-2014 12:01:26	15.561	4.792	965.6	2.727	-0.043	4751.2	4937.8
12-03-2014 12:02:26	16.177	4.339	779.0	2.868	-0.110	4859.6	4937.8
12-03-2014 12:03:26	16.784	3.862	665.9	2.869	-0.150	4950.7	5215.6
12-03-2014 12:04:26	16.805	3.811	642.3	2.775	-0.239	4795.2	5316.8
12-03-2014 12:05:26	16.871	3.773	639.4	2.728	-0.160	4818.8	5317.0
12-03-2014 12:06:26	16.797	3.818	655.5	2.717	-0.177	4765.3	5313.3
12-03-2014 12:07:26	16.160	4.237	786.1	2.728	-0.226	4859.0	5312.0
12-03-2014 12:08:26	15.694	4.628	917.3	2.651	-0.176	4601.8	5311.9
12-03-2014 12:09:26	15.465	4.848	1006.5	2.610	-0.115	4461.2	5070.4
12-03-2014 12:10:26	15.390	4.898	1030.8	2.763	-0.095	4581.4	4982.6
12-03-2014 12:11:26	15.409	4.888	1045.6	2.775	-0.090	4619.6	4982.5
12-03-2014 12:12:26	15.780	4.653	888.3	2.807	-0.105	4836.9	5044.5
12-03-2014 12:13:26	16.559	4.033	692.2	2.911	-0.188	4741.0	5066.9
12-03-2014 12:14:26	16.849	3.795	640.3	2.829	-0.132	4793.2	5066.9
12-03-2014 12:15:26	16.817	3.810	648.8	2.790	-0.177	4872.9	5290.1
12-03-2014 12:16:26	16.838	3.798	644.4	2.733	-0.235	4832.4	5370.8
12-03-2014 12:17:26	16.660	3.890	677.1	2.774	-0.217	4853.5	5370.7
12-03-2014 12:18:26	16.107	4.298	800.5	2.702	-0.189	4954.6	5616.1
12-03-2014 12:19:26	15.595	4.729	946.0	2.566	-0.091	4748.9	5705.4
12-03-2014 12:20:26	15.236	5.012	1140.3	2.699	-0.055	4525.1	5705.4
12-03-2014 12:21:26	15.356	4.950	1071.1	2.880	-0.056	4614.6	5211.4
12-03-2014 12:22:26	15.456	4.885	1031.8	2.878	-0.027	4691.9	5031.7
12-03-2014 12:23:26	16.275	4.258	761.6	2.888	-0.057	4865.8	5031.9
12-03-2014 12:24:26	16.798	3.847	652.9	2.902	-0.088	4863.1	5295.2
12-03-2014 12:25:26	17.011	3.674	612.5	2.733	-0.175	4813.0	5391.0

Run Averages	O2	CO2	CO	NOx	SO2	THC	CH4
	%	%	ppm	ppm	ppm	ppm	ppm
12-03-2014 12:25:26	16.112	4.350	847.2	2.777	0.015	4739.2	5066.8

Operator: Sean MacKay
Plant Name: L&RR Landfill Flare
Location: Stack
Test Run 5 End

CEM RUN 3

CEM RUN 3

Final System Bias Check, Run 5 STRATA Version 3.2
Operator: Sean MacKay
Plant Name: L&RR Landfill Flare
Location: Stack

Reference Cylinder Numbers

	Zero	Span
O2		
CO2		
CO		
NOx		
SO2		
THC		
CH4		

Date/Time 12-03-2014 12:35:54 PASSED

Analyte	O2	CO2	CO	NOx	SO2	THC	CH4
Units	%	%	ppm	ppm	ppm	ppm	ppm
Zero Ref Cyl	0.000	0.000	0.0	0.000	0.000	0.0	0.0
Zero Cal	0.028	0.111	0.3	0.211	0.912	0.0	0.0
Zero Avg	0.103	0.169	2.3	0.611	-0.090	0.0	0.0
Zero Bias%	0.3%	0.3%	0.1%	0.4%	1.1%	0.0%	0.0%
Zero Drift%	0.1%	0.1%	0.1%	0.1%	0.1%	0.0%	0.0%
Span Ref Cyl	11.340	9.860	1006.0	53.100	48.600	0.0	0.0
Span Cal	11.294	9.912	1003.8	53.163	48.337	0.0	0.0
Span Avg	11.246	9.966	980.8	52.661	48.592	0.0	0.0
Span Bias%	0.2%	0.3%	1.2%	0.5%	0.3%	0.0%	0.0%
Span Drift%	-0.1%	0.0%	-0.3%	1.7%	1.3%	0.0%	0.0%
Ini Zero Avg	0.091	0.150	0.2	0.510	-0.177	0.0	0.0
Ini Span Avg	11.264	9.969	985.8	51.065	47.397	0.0	0.0
Run Avg	16.112	4.350	847.2	2.777	0.015	4739.2	5066.8
Co	0.097	0.159	1.2	0.560	-0.133	0.0	0.0
Cm	11.255	9.967	983.3	51.863	47.995	0.0	0.0
Correct Avg	16.276	4.213	866.6	2.294	0.150	0.0	0.0

System Bias Check End

CEM RUN 3

Test Run 6 STRATA Version 3.2

	O2	CO2	CO
	%	%	ppm
Begin calculating run averages			
12-03-2014 12:47:13	16.839	3.792	647.8
12-03-2014 12:48:13	16.638	3.901	685.1
12-03-2014 12:49:13	16.046	4.304	815.7
12-03-2014 12:50:13	15.532	4.758	952.5
12-03-2014 12:51:13	15.340	4.924	1078.5
12-03-2014 12:52:13	15.304	4.963	1108.3
12-03-2014 12:53:13	15.414	4.898	1043.3
12-03-2014 12:54:13	16.157	4.328	788.3
12-03-2014 12:55:13	16.804	3.836	648.1
12-03-2014 12:56:13	16.864	3.757	634.5
12-03-2014 12:57:13	16.921	3.729	620.8
12-03-2014 12:58:13	16.842	3.773	640.7
12-03-2014 12:59:13	16.265	4.125	751.2
12-03-2014 13:00:13	15.672	4.627	915.6
12-03-2014 13:01:13	15.292	4.943	1106.6
12-03-2014 13:02:13	15.212	5.012	1135.9
12-03-2014 13:03:13	15.277	4.970	1095.9
12-03-2014 13:04:13	15.858	4.568	858.2
12-03-2014 13:05:13	16.675	3.923	672.7
12-03-2014 13:06:13	16.942	3.712	620.7
12-03-2014 13:07:13	16.942	3.703	620.8
12-03-2014 13:08:13	16.817	3.787	641.7
12-03-2014 13:09:13	16.555	3.933	700.8
12-03-2014 13:10:13	15.835	4.488	860.0
12-03-2014 13:11:13	15.390	4.867	1027.8
12-03-2014 13:12:13	15.290	4.953	1089.9
12-03-2014 13:13:13	15.280	4.962	1098.7
12-03-2014 13:14:13	15.564	4.789	961.3
12-03-2014 13:15:13	16.430	4.125	718.3
12-03-2014 13:16:13	16.859	3.770	638.5
12-03-2014 13:17:13	16.945	3.699	616.4
12-03-2014 13:18:13	16.946	3.689	610.9
12-03-2014 13:19:13	16.676	3.854	674.2
12-03-2014 13:20:13	15.973	4.366	822.4
12-03-2014 13:21:13	15.533	4.751	958.5
12-03-2014 13:22:13	15.325	4.938	1065.3
12-03-2014 13:23:13	15.265	4.977	1094.7
12-03-2014 13:24:13	15.472	4.854	1005.2
12-03-2014 13:25:13	16.258	4.236	752.0
12-03-2014 13:26:13	16.792	3.820	644.7
12-03-2014 13:27:13	16.965	3.696	616.6
12-03-2014 13:28:13	16.906	3.729	631.0
12-03-2014 13:29:13	16.689	3.861	662.6
12-03-2014 13:30:13	16.101	4.250	795.2
12-03-2014 13:31:13	15.668	4.663	912.6
12-03-2014 13:32:13	15.413	4.844	1017.6
12-03-2014 13:33:13	15.203	5.021	1155.8
12-03-2014 13:34:13	15.290	4.968	1102.6
12-03-2014 13:35:13	15.942	4.505	833.7
12-03-2014 13:36:13	16.676	3.920	674.7
12-03-2014 13:37:13	16.922	3.734	621.8
12-03-2014 13:38:13	17.017	3.665	607.9
12-03-2014 13:39:13	16.836	3.779	644.8
12-03-2014 13:40:13	16.402	4.039	732.8
12-03-2014 13:41:13	15.731	4.573	894.8
12-03-2014 13:42:13	15.215	4.991	1105.3
12-03-2014 13:43:13	15.225	5.007	1110.4
12-03-2014 13:44:13	15.338	4.939	1072.2
12-03-2014 13:45:13	16.027	4.444	813.3
12-03-2014 13:46:13	16.788	3.844	647.2

Run Averages	O2	CO2	CO
	%	%	ppm
12-03-2014 13:46:13	16.107	4.331	834.5

Operator: Sean MacKay
Plant Name: L&RR Landfill Flare
Location: Stack
Test Run 6 End

Final System Bias Check, Run 6 STRATA Version 3.2
Operator: Sean MacKay
Plant Name: L&RR Landfill Flare
Location: Stack

Reference Cylinder Numbers
Zero Span
O2
CO2
CO

Date/Time 12-03-2014 13:52:07 PASSED

Analyte	O2	CO2	CO
Units	%	%	ppm
Zero Ref Cyl	0.000	0.000	0.0
Zero Cal	0.028	0.111	0.3
Zero Avg	0.131	0.188	2.2
Zero Bias%	0.5%	0.4%	0.1%
Zero Drift%	0.1%	0.1%	0.0%
Span Ref Cyl	11.340	9.860	1006.0
Span Cal	11.294	9.912	1003.8
Span Avg	11.244	9.934	1002.7
Span Bias%	0.2%	0.1%	0.1%
Span Drift%	0.0%	-0.2%	1.1%
Ini Zero Avg	0.103	0.169	2.3
Ini Span Avg	11.246	9.966	980.8
Run Avg	16.107	4.331	834.5
Co	0.117	0.178	2.2
Cm	11.245	9.950	991.7
Correct Avg	16.294	4.190	846.1

System Bias Check End

Test Run 7 STRATA Version 3.2

	O2	CO2	CO	NOx	SO2	THC	CH4
	%	%	ppm	ppm	ppm	ppm	ppm
Begin calculating run averages							
12-03-2014 13:57:01	20.775	0.155	0.2	0.799	1.326	85.1	87.0
12-03-2014 13:58:01	20.776	0.151	0.2	0.644	0.777	85.9	103.3
Run Averages	O2	CO2	CO	NOx	SO2	THC	CH4
	%	%	ppm	ppm	ppm	ppm	ppm
12-03-2014 13:58:43	20.775	0.152	0.2	0.692	0.915	85.7	97.3

Operator: Sean MacKay
Plant Name: L&RR Landfill Flare
Location: Stack
Test Run 7 End

FID/GC Post CAL

CH_4 = 90.58 ppm

Appendix G

CYCLONIC FLOW TRAVERSE DATA

FACILITY: LNRR DATE: 12/2/14

UNIT#: Flare RUN TIME:

RUN#: 1 STATIC P: 0.0

PITOT LEAK-TEST DATA

INITIAL RATE PITOTS: @ 3 FINAL RATE PITOTS:

TRAVERSE POINT	VELOCITY HEAD	ROTATION ANGLE	STACK TEMP F
A 1	0.005	0°	960
2	0.010	0°	956
3	0.010	0°	957
4	0.015	0°	953
5	0.020	0°	950
6	0.015	0°	948
7	0.010	0°	948
8	0.010	0°	947
B 1	0.015	0°	943
2	0.020	0°	950
3	0.020	0°	955
4	0.015	0°	956
5	0.020	0°	956
6	0.020	0°	955
7	0.020	0°	954
8	0.015	0°	953

CEMS SERVICES 360 Old Colony Road, Suite 1, Norton, MA 02766

METHOD 26A SAMPLING DATA SHEET

Facility: Lamar Unit : Flare

Date : 12/2/14 Run Time : 1213-1327

Run : 1 Filter No. : —

Nozzle No.:

Leak Test Data

Initial Rate: Probe: 0.00615 "Hg Pitots: 0.3 "H_2O

Final Rate: Probe: 0.00065 "Hg Pitots: 0.3 "H_2O

Initial Meter Reading: 928.700 Final Meter Reading: 963.885

Time Hr	Time Min	Trav. Point	Delta P	Delta H	Meter Vol.	Probe Temp	DGM Out	Imp Temp	Stack Temp	Hot Temp	Pump Vac
	3.75	A1	0.008	0.80	930.6	250	66	37	796	239	1
	7.5	2	0.010	1.00	933.0	250	66	38	770	246	1
	11.25	3	0.011	1.10	935.0	250	67	38	983	252	1
	15	4	0.011	1.10	937.4	251	68	41	796	256	1
	18.75	5	0.015	1.50	940.1	251	69	41	855	252	1
	22.5	6	0.014	1.40	942.2	250	70	41	911	253	1
	26.75	7	0.014	1.40	944.8	248	70	42	770	252	1
	30	8	0.008	0.80	946.3	249	70	43	853	250	1
	33.75	B1	0.008	0.80	948.0	250	73	43	868	246	1
	37.5	2	0.010	1.00	950.5	251	76	43	770	249	1
	41.25	3	0.010	1.00	952.3	247	76	44	886	253	1
	45	4	0.014	1.40	954.8	248	77	45	978	250	1
	48.75	5	0.014	1.40	957.4	250	77	45	784	249	1
	52.5	6	0.012	1.20	959.5	252	77	46	935	250	1
	56.25	7	0.010	1.00	961.9	248	79	47	936	247	1
	60	8	0.010	1.00	963.885	246	80	48	771	248	1

General:
Box No : MB-3
Delta H@: 1.80
Gamma Y: [illegible]
1.0011

Operators:
Box : CP
Probe: MC
CEMS: SM

Conditions:
Ambient Temp: ____
Pbar : 30.35
Static P : 0.0
O_2 16.16
CO_2 4.32

Moisture Data:

Gross	Tare	Net
116	100	16 ml
112	100	12 ml
1	0	1 ml
555.9	550	5.9 g

R 100
VF>

CEMSERVICES 360 Old Colony Road, Suite 1, Norton, MA 02766

METHOD 23 SAMPLING DATA SHEET

Page 1 of 1

Facility: L&R Unit : Flare

Date : 12/2/14 Run Time : 1113-1425

Run : 1 Filter No. : —

Nozzle No.:

Leak Test Data

Initial Rate:
Probe: 0.001 @ 15 "Hg
Pitots: @ 3 "H_2O

Final Rate:
Probe: 0.000 @ 10 "Hg
Pitots: @ 3 "H_2O

214.100

Initial Meter Reading: [illegible] Final Meter Reading: 310.030

Time Hr	Time Min	Trav. Point	Delta P	Delta H	Meter Vol.	Trap Temp	DGM Out	Imp Temp	Stack Temp	Hot Temp	Pump Vac
	11.25	B1	0.058	0.64	219.0	40	49	40	892	249	4
	22.5	2	0.010	0.71	224.4	36	54	35	906	251	5
	33.75	3	0.015	1.06	230.9	36	59	35	827	250	6
	45	4	0.014	0.99	237.5	37	64	37	802	250	6
	56.25	5	0.015	1.06	244.3	38	69	39	776	250	6
1	7.5	6	0.015	1.06	250.9	38	73	37	770	251	6
1	18.75	7	0.014	0.99	257.8	41	76	41	819	253	6
1	30	8	0.010	0.71	263.2	40	79	40	833	250	6
1	41.25	A1	0.007	0.50	267.8	46	82	45	819	249	6
1	52.5	2	0.010	0.71	272.5	44	85	44	957	250	6
2	3.75	3	0.015	1.06	279.6	46	86	45	967	248	6
2	15	4	0.015	1.06	286.7	49	86	45	945	250	6
2	26.25	5	0.014	0.99	293.4	52	89	50	889	249	6
2	37.5	6	0.010	0.71	298.9	54	89	52	977	256	6
2	48.75	7	0.010	0.71	304.6	55	89	54	801	252	6
3	0	8	0.010	0.71	310.030	56	90	55	795	253	6

General:
Box No : MB-2
Delta H@: 1.66
Gamma Y: 1.0098

Operators:
Box : CP
Probe: MC
CEMS: SM

Conditions:
Ambient Temp: ____
Pbar : 30.54
Static P : 0.0

Moisture Data:

Gross	Tare	Net
65	0	65 ml
100	100	0 ml
90	100	-10 ml
1	0	1 g

567.2550 17.2

O_2 16.16

CO_2 4.32

CEMServices 360 Old Colony Road, Suite 1, Norton, MA 02766

METHOD 23 SAMPLING DATA SHEET

Page 1 of 1

Facility: L&RR Unit : Flare

Date : 12/2/14 Run Time : 1508-1814

Run : 2 Filter No. : —

Nozzle No.:

Leak Test Data

Initial Rate: Probe: 0.00615 "Hg Pitots: Ø&3 "H_2O

Final Rate: Probe: 0.00610 "Hg Pitots: Ø&3 "H_2O

Initial Meter Reading: 311.100 Final Meter Reading: 409.060

Time Hr	Time Min	Trav. Point	Delta P	Delta H	Meter Vol.	Trap Temp	DGM Out	Imp Temp	Stack Temp	Hot Temp	Pump Vac
	11.25	A1	0.009	0.64	316.1	45	82	40	840	236	5
	22.5	2	0.009	0.64	321.2	39	78	39	913	248	5
	33.75	3	0.012	0.85	327.2	40	76	40	975	250	6
	45	4	0.015	1.06	333.6	40	75	40	967	251	6
	56.25	5	0.015	1.06	340.4	40	75	40	976	248	6
1	7.5	6	0.015	1.06	347.0	46	75	46	912	249	6
1	18.75	7	0.012	0.85	353.0	54	76	45	761	250	6
1	30	8	0.012	0.85	359.0	57	78	42	789	243	6
1	41.25	B1	0.010	0.71	364.5	60	79	42	845	245	6
1	52.5	2	0.010	0.71	370.2	60	79	43	776	249	6
2	3.75	3	0.012	0.85	376.2	63	81	44	854	250	6
2	15	4	0.015	1.06	382.9	63	82	44	954	252	6
2	26.25	5	0.017	1.21	390.1	46	82	42	977	250	6
2	37.5	6	0.017	1.21	397.3	44	84	45	990	248	8
2	48.75	7	0.012	0.85	403.5	45	84	45	961	252	8
3	0	8	0.010	0.71	409.060	45	84	45	939	247	8

General:
Box No : MB-2
Delta H@: 1.66
Gamma Y: 1.00978

Operators:
Box : CP
Probe: MC
CEMS: SM

Conditions:
Ambient Temp:
Pbar : 30.51
Static P 0.0

O_2 16.17
CO_2 4.36

Moisture Data:

Gross	Tare	Net
65	0	65 ml
100	100	0 ml
100	100	0 ml
1	0	1 g

566.9 556 16.9

CEMSERVICES 360 Old Colony Road, Suite 1, Norton, MA 02766

METHOD 26A SAMPLING DATA SHEET

Page 1 of 1

Facility: L&RR Unit : Flare

Date : 12/2/14 Run Time : 1608-1704

Run : 2 Filter No. : —

Nozzle No.:

Leak Test Data

Initial Rate: Probe: 0.00615 "Hg Pitots: Ø 3 "H_2O

Final Rate: Probe: 0.00065 "Hg Pitots: Ø 3 "H_2O

Initial Meter Reading: 964.600 Final Meter Reading: 1002.775

Time Hr	Time Min	Trav. Point	Delta P	Delta H	Meter Vol.	Probe Temp	DGM Out	Imp Temp	Stack Temp	Hot Temp	Pump Vac
	3.75	B 1	0.008	0.96	966.6	246	64	44	910	250	1
	7.5	2	0.008	0.90	968.6	250	65	40	959	252	1
	11.25	3	0.010	1.20	970.7	251	65	40	946	250	1
	15	4	0.010	1.20	972.9	248	65	41	792	248	1
	18.75	5	0.015	1.80	975.4	248	66	42	972	250	1
	22.5	6	0.015	1.80	978.2	248	66	43	766	246	1
	26.75	7	0.013	1.56	980.9	249	68	44	878	248	1
	30	8	0.013	1.56	983.5	249	69	46	810	250	1
	33.75	A 1	0.008	0.96	985.5	249	69	48	756	251	1
	37.5	2	0.009	1.08	987.7	250	69	48	936	246	1
	41.25	3	0.010	1.20	990.0	251	69	48	900	248	1
	45	4	0.013	1.56	992.1	251	69	49	962	250	1
	48.75	5	0.015	1.80	995.4	248	71	49	982	250	1
	52.5	6	0.015	1.80	998.0	250	73	46	986	246	1
	56.25	7	0.013	1.56	1000.6	250	73	47	899	252	1
	60	8	0.010	1.20	1002.7	246	73	47	965	252	1

General:
Box No : MB-3
Delta H@: 1.80
Gamma Y: 1.00

Operators:
Box : CP
Probe: MC
CEMS: SM

Conditions:
Ambient Temp:
Pbar : 30.51
Static P : 0.0

O_2 16.17
CO_2 4.36

Moisture Data:

Gross	Tare	Net
126	100	26 ml
113	100	13 ml
1	0	1 ml
5565	550	6.5 g

R = 100

CEMS SERVICES 360 Old Colony Road, Suite 1, Norton, MA 02766

METHOD 26A SAMPLING DATA SHEET

Page 1 of 1

Facility: _____ Unit : Flare

Date : 12/3/14 Run Time : 1250 - 1400

Run : 3 Filter No. : —

Nozzle No.: _____

Leak Test Data

Initial Rate: Probe: 0.001 GLS "Hg Pitots: ~~GLS~~ 3 "H_2O

Final Rate: Probe: 0.006 "Hg Pitots: ~~GLS~~ 3 "H_2O

Initial Meter Reading: 003.100 Final Meter Reading: 042.417

Time Hr	Time Min	Trav. Point	Delta P	Delta H	Meter Vol.	Probe Temp	DGM Out	Imp Temp	Stack Temp	Hot Temp	Pump Vac
	3.75	A 1	0.009	1.08	005.4	246	77	45	906	253	1
	7.5	2	0.009	1.08	007.6	250	75	50	921	250	1
	11.25	3	0.011	1.32	009.5	251	75	51	774	246	1
	15	4	0.015	1.80	012.3	250	75	52	965	248	1
	18.75	5	0.015	1.80	015.0	250	75	52	845	249	1
	22.5	6	0.015	1.44	017.7	253	75	52	781	249	1
	26.75	7	0.010	1.20	020.0	250	75	52	962	250	1
	30	8	0.010	1.20	022.5	245	75	53	810	256	1
	33.75	B 1	0.010	1.20	024.8	249	75	50	864	253	1
	37.5	2	0.011	1.32	027.1	249	75	50	972	243	2
	41.25	3	0.011	1.32	029.6	256	75	51	777	249	2
	45	4	0.012	1.44	032.1	252	76	51	902	250	2
	48.75	5	0.015	1.80	034.8	250	76	53	930	252	2
	52.5	6	0.015	1.80	038.0	250	76	53	767	256	2
	56.25	7	0.011	1.32	040.2	252	76	54	965	253	2
	60	8	0.009	1.08	042.4	250	76	54	820	250	2

General:
Box No : MB-3
Delta H@: 1.86
Gamma Y: 1.0011

Operators:
Box : CP
Probe: MC
CEMS: SM

Conditions:
Ambient Temp: _____
Pbar : 29.85
Static P : 0.0

Moisture Data:

Gross	Tare	Net
124	100	24 ml
110	100	10 ml
1	0	1 ml
558.7	550	8.7 g

O_2 = 16.29
CO_2 = 4.19

CEMS SERVICES 360 Old Colony Road, Suite 1, Norton, MA 02766

METHOD 23 SAMPLING DATA SHEET

Facility: CARR Unit : Flare

Date : 12/3/14 Run Time : 0900 - 1215

Run : 3 Filter No. : —

Nozzle No.: _____

Leak Test Data

Initial Rate:
Probe: 0.002 @ 15 "Hg
Pitots: @ 3 "H_2O

Final Rate:
Probe: 0.000 @ 10 "Hg
Pitots: @ 3 "H_2O

Initial Meter Reading: 409.700 Final Meter Reading: 517.903

Time Hr	Time Min	Trav. Point	Delta P	Delta H	Meter Vol.	Trap Temp	DGM Out	Imp Temp	Stack Temp	Hot Temp	Pump Vac
	11.25	A 1	0.007	0.62	415.9	38	41	41	804	246	5
	22.5	2	0.010	0.88	421.9	39	48	39	834	250	6
	33.75	3	0.010	0.88	427.8	39	51	39	854	250	6
	45	4	0.012	1.06	434.4	40	54	40	946	251	6
	56.25	5	0.015	1.32	441.6	41	59	40	985	250	6
1	7.5	6	0.015	1.32	448.7	41	64	40	998	248	8
1	18.75	7	0.012	1.06	455.7	42	70	40	935	249	8
1	30	8	0.010	0.88	462.4	42	73	41	973	250	8
1	41.25	B 1	0.009	0.79	468.2	49	78	47	774	250	8
1	52.5	2	0.010	0.88	475.0	43	80	40	774	253	8
2	3.75	3	0.010	0.88	481.1	43	81	42	875	250	8
2	15	4	0.015	1.32	486.3	44	85	42	853	247	8
2	26.25	5	0.017	1.50	496.3	45	88	42	944	249	8
2	37.5	6	0.015	1.32	503.2	46	89	44	990	250	8
2	48.75	7	0.012	1.06	511.3	48	89	44	951	248	8
3	0	8	0.010	0.88	517.9	50	89	44	900	247	8

General:
Box No : MB-2
Delta H@: 1.66
Gamma Y: 1.0098

Operators:
Box : CR
Probe: MC
CEMS: SM

Conditions:
Ambient Temp: _____
Pbar : 29.95
Static P : 0.0

O_2 - 16.26
CO_2 - 4.22

Moisture Data:

Gross	Tare	Net
87	0	87 ml
103	100	3 ml
101	100	1 ml
4	0	4 g

571.3550 21.3

CEMServices 360 Old Colony Road, Suite 1, Norton, MA 02766

METHOD 1-2 SAMPLING DATA SHEET

FACILITY: L&RR

Unit : Inlet

DATE : 12/2/14

Run Time: 1200-1210

Run No.: 1

Static P: +5

Leak Test Data

Initial Pitot: 0.005 " H2O

Final Pitot: 0.003 " H2O

Traverse Point	Delta P	Stack Temp.
A1	0.00	97
2	0.00	97
3	0.00	97
4	0.26	98
5	0.31	98
6	0.32	98
7	0.31	98
8	0.28	97

METHOD 1-2 SAMPLING DATA SHEET

FACILITY: Baker

Unit : Inlet

DATE : 12/2/14

Run Time: 1410 - 1420

Run No.: 2

Static P: +5

Leak Test Data

Initial Pitot: 0.00 C3 H2O

Final Pitot: 0.003 " H2O

Traverse Point	Delta P	Stack Temp.
A1	0.00	98
2	0.00	98
3	0.00	98
4	0.24	97
5	0.28	97
6	0.29	98
7	0.30	98
8	0.29	97

METHOD 1-2 SAMPLING DATA SHEET

FACILITY: C&RR

Unit : Inlet

DATE : 12/2/14

Run Time: 1640-1650

Run No.: 3

Static P: +5

Leak Test Data

Initial Pitot: 0.003 " H2O

Final Pitot: 0.003 " H2O

Traverse Point	Delta P	Stack Temp.
A1	0.00	97
2	0.00	98
3	0.03	97
4	0.23	97
5	0.30	98
6	0.34	97
7	0.34	97
8	0.31	97

METHOD 1-2 SAMPLING DATA SHEET

FACILITY: LeRR

Unit : Inlet

DATE : 12/3/14

Run Time: 1040

Run No.: TO-15-1

Static P: +5

Leak Test Data

Initial Pitot: 0.00e3 " H2O

Final Pitot: 0.00e3 " H2O

Traverse Point	Delta P	Stack Temp.
A1	0.00	96
2	0.00	95
3	0.00	96
4	0.22	96
5	0.29	97
6	0.31	96
7	0.33	96
8	0.28	96

METHOD 1-2 SAMPLING DATA SHEET

FACILITY: LeRR

Unit : Inlet

DATE : 12/3/14

Run Time: 1225

Run No.: 10-15-2

Static P: +5

Leak Test Data

Initial Pitot: 0.00 ~~2~~ 3" H2O

Final Pitot: 0.00 ~~2~~ 3" H2O

Traverse Point	Delta P	Stack Temp.
1	0.00	95
2	0.00	95
3	0.00	95
4	0.21	95
5	0.29	95
6	0.33	96
7	0.32	96
8	0.29	95

METHOD 1-2 SAMPLING DATA SHEET

FACILITY: LEPR

Unit : Inlet

DATE : 12/3

Run Time: 1640

Run No.: TO-15-3

Static P: +5

Leak Test Data

Initial Pitot: 0.003 " H2O

Final Pitot: 0.003 " H2O

Traverse Point	Delta P	Stack Temp.
A1	0.00	94
2	0.00	95
3	0.00	95
4	0.22	95
5	0.30	96
6	0.32	96
7	0.32	95
8	0.29	96

VOLATILE ORGANIC CARBON

FACILITY: LERR — SAMPLE LOCATION: Inlet / Outlet

LOCATION: Smithfield RI — OPERATOR: SM / JJ

DATE: 12/3/14 — RUN NUMBER: TO-15

TANK NUMBER: ____ TRAP NUMBER: ____ SAMPLE ID NUMBER: ____

TANK VACUUM mm Hg	TANK VACUUM cm Hg	BAROMETRIC PRESSURE mm Hg	AMBIENT TEMPERATURE °C
PRETEST (MANOMETER)	(GAUGE)	29.99	40 F / 4.4 C
POST-TEST (MANOMETER)	(GAUGE)	29.86	50.7 F / 10.4 C

LEAK RATE ____ cm Hg / 5.0 min.

PRETEST ____

TIME CLOCK/SAMPLE	VACUUM cm Hg	FLOWMETER SETTINGS (Final Vac)	COMMENTS
RUN 1 0900	IN 28	1	TANK 14556 / Flow FX0530
1040	OUT 30	1	TANK 14517 / Flow FX0586
RUN 2 1045	IN 27	2	TANK T21633 / Flow FX0447
1220	OUT 27	1	TANK T8338 / Flow FX0576
RUN 3 1235	IN 30	1	TANK 17186 / Flow FX0867
1435	OUT 30		TANK 14946 / Flow FX0428

TO-15

Figure ~~25-8.~~ Example Field Data Form

VOLATILE ORGANIC CARBON

FACILITY: Lovac — SAMPLE LOCATION: Inlet

LOCATION: _____ — OPERATOR: JD/Sm

DATE: 12/2/14 — RUN NUMBER: 1

TANK NUMBER: 207 — TRAP NUMBER: AJS — SAMPLE ID NUMBER: _____

	TANK VACUUM mm Hg / cm Hg	BAROMETRIC PRESSURE mm Hg	AMBIENT TEMPERATURE °C
PRETEST (MANOMETER)	18.5" Hg (GAUGE)	30.57	37°F/3°C
POST-TEST (MANOMETER)	4 (GAUGE)	30.55	36°/2.4°C

LEAK RATE _____ cm Hg/1.0 min

PRETEST _____

TIME CLOCK/SAMPLE	VACUUM cm Hg	FLOWMETER SETTINGS	COMMENTS
1055	18" Hg	60	
1100	17	60	
1105	16	60	
1110	15	60	
1115	14	60	
1120	13	60	
1125	12	60	
1130	11	60	
1135	10	60	
1140	9	60	
1145	7	60	
1150	6	60	
1155	6	60	

Figure 25-8. Example Field Data Form

VOLATILE ORGANIC CARBON

FACILITY CERR — SAMPLE LOCATION Outlet

LOCATION Smithfield RI — OPERATOR JJ / mc

DATE 12/2/14 — RUN NUMBER 1

TANK NUMBER 6182 — TRAP NUMBER HE — SAMPLE ID NUMBER

	TANK VACUUM mm Hg	cm Hg	BAROMETRIC PRESSURE mm Hg	AMBIENT TEMPERATURE °C
PRETEST (MANOMETER)	30" Hg (GAUGE)		30.57	37°F / 3°C
POST-TEST (MANOMETER)	0" Hg (GAUGE)		30.55	37°F / 3°C

LEAK RATE _____ cm Hg / 1 min

PRETEST _____

TIME CLOCK/SAMPLE	VACUUM cm Hg	FLOWMETER SETTINGS	COMMENTS
1055	30"	100 cc/min	
1100	26	100	
1105	22	100	
1110	18	100	
1115	14	100	
1120	12	100	
1125	11	100	
1130	5	100 50	
1135	3	50	
1140	0	0	STOP Test 1140
1145			
1150			
1155			

Figure 25-8. Example Field Data Form

VOLATILE ORGANIC CARBON

FACILITY LeRR — SAMPLE LOCATION Inlet

LOCATION Smithfield RE — OPERATOR SM / JJ

DATE 12/2/14 — RUN NUMBER 2

TANK NUMBER 114 — TRAP NUMBER IC — SAMPLE ID NUMBER

	TANK VACUUM mm Hg	cm Hg	BAROMETRIC PRESSURE mm Hg	AMBIENT TEMPERATURE °C
PRETEST (MANOMETER)	18.5 (GAUGE)		30.54	36F/2.4°C
POST-TEST (MANOMETER)	4 (GAUGE)		30.52	36F/2.2C

LEAK RATE _____ cm Hg/1.0 min

PRETEST _____

TIME CLOCK/SAMPLE	VACUUM cm Hg	FLOWMETER SETTINGS	COMMENTS
1305	19	60	
1310	18	60	
1315	17	60	
1320	16	60	
1325	14	60	
1330	12	60	
1335	10	60	
1340	9	60	
1345	8	60	
1350	7	60	
1355	6	60	
1400	5	60	
1405	4	60	

Figure 25-8. Example Field Data Form

VOLATILE ORGANIC CARBON

FACILITY: LCRR — SAMPLE LOCATION: outlet

LOCATION: Smithfield RI — OPERATOR: SM / JJ

DATE: 12/2/14 — RUN NUMBER: 2

TANK NUMBER: 6102 — TRAP NUMBER: MLX — SAMPLE ID NUMBER:

	TANK VACUUM mm Hg	TANK VACUUM cm Hg	BAROMETRIC PRESSURE mm Hg	AMBIENT TEMPERATURE °C
PRETEST (MANOMETER)	30	(GAUGE)	30.54	36°F / 24°C
POST-TEST (MANOMETER)	3	(GAUGE)	30.52	36°F / 22°C

LEAK RATE: _____ cm Hg / 1.0 min

PRETEST: _____

TIME CLOCK/SAMPLE	VACUUM cm Hg	FLOWMETER SETTINGS	COMMENTS
1305	28	60	
1310	25	60	
1315	23	60	
1320	21	60	
1325	19	60	
1330	16	60	
1335	13	60	
1340	11	60	
1345	9	60	
1350	8	60	
1355	6	60	
1400	4	60	
1405	3	60	

Figure 25-8. Example Field Data Form

VOLATILE ORGANIC CARBON

FACILITY: LERR — SAMPLE LOCATION: Inlet

LOCATION: Smithfield RI — OPERATOR: SM / JJ

DATE: 12/2/14 — RUN NUMBER: 3

TANK NUMBER: 176 — TRAP NUMBER: XA — SAMPLE ID NUMBER:

	TANK VACUUM mm HG / cm Hg	BAROMETRIC PRESSURE mm Hg	AMBIENT TEMPERATURE °C
PRETEST (MANOMETER)	19 (GAUGE)	30.51	36.5°F / 2.4°C
POST-TEST (MANOMETER)	3 (GAUGE)	30.52	35.9°F / 2°C

LEAK RATE: _____ cm Hg / 1.0 min

PRETEST: _____

TIME CLOCK/SAMPLE	VACUUM cm Hg	FLOWMETER SETTINGS	COMMENTS
1530	19	60	
1535	18	60	
1540	17	60	
1545	16	60	
1550	15	60	
1555	14	60	
1600	13	60	
1605	12	60	
1610	10	60	
1615	8	60	
1620	7	60	
1625	5	60	
1630	3	60	

Figure 25-8. Example Field Data Form

VOLATILE ORGANIC CARBON

FACILITY: LeRR — SAMPLE LOCATION: outlet

LOCATION: Smithfield RI — OPERATOR: SM/JJ

DATE: 12/2/14 — RUN NUMBER: 3

TANK NUMBER: 6153P — TRAP NUMBER: ALH — SAMPLE ID NUMBER:

	TANK VACUUM mm Hg	cm Hg	BAROMETRIC PRESSURE mm Hg	AMBIENT TEMPERATURE °C
PRETEST (MANOMETER)	30	(GAUGE)	30.51	36.5°F/2.4°C
POST-TEST (MANOMETER)	6	(GAUGE)	30.52	35.9°F/2.2°C

LEAK RATE: _____ cm Hg/1.0 min

PRETEST: _____

TIME CLOCK/SAMPLE	VACUUM cm Hg	FLOWMETER SETTINGS	COMMENTS
1530	30	60	
1535	27	60	
1540	25	60	
1545	22	60	
1550	20	60	
1555	18	60	
1600	16	60	
1605	14	60	
1610	12	60	
1615	10	60	
1620	9	60	
1625	7	60	
1630	6	60	

Figure 25-8. Example Field Data Form

Appendix H

Maxxam
A Bureau Veritas Group Company

Prepared for: CEM Services Inc.

Project: L&RR

Analytical Data Package

Analysis: Method 23 / CARB 428

Maxxam Job #: B4N0984

Maxxam Analytics International
6740 Campobello Rd.
Mississauga, Ontario, Canada
L5N 2L8
1-800-668-0639
www.maxxamanalytics.com

Maxxam
A Bureau Veritas Group Company

I hereby certify that to the best of my knowledge all analytical data presented in this report:

- Has been checked for completeness.
- Is accurate, legible and error free.
- Has been conducted in accordance with approved SOP's and that all deviations are clearly listed in the Case Narrative.
- This report has been generated in .pdf format.

Review Performed By:

Customer Service Manager

Maxxam
A Bureau Veritas Group Company

2015.01.19 16:33:54 -05'00'

Maxxam Analytics International
6740 Campobello Rd.
Mississauga, Ontario, Canada
L5N 2L8
1-800-668-0639
www.maxxamanalytics.com

Glossary of Terms

- ***MDL*** represents the Minimum Detection Limit below which the laboratory cannot confirm the presence of the analyte to the 95% confidence level.
- ***RDL*** represents the Reportable Detection Limit and is usually set at a value equivalent to the lowest calibration standard
- ***Acceptance Criteria*** are values used by the laboratory to determine that a process is in control.
- ***Accuracy*** is the degree of agreement of a measured value with the true or expected value.
- ***Calibration Standards*** are a set of solutions containing the analytes of interest at a specified concentration.
- ***Calibration Verification Standard*** consists of a calibration standard solution of intermediate concentration (mid-point initial calibration level) used to access whether the initial calibration is still valid
- ***Certified Reference Material*** is a stable homogenous material that is certified by repetitive analysis from a supplier who is certified to generate said materials.
- ***Internal Standard*** a deuterated or ^{13}C-labelled analyte that is added to a sample extract prior to instrumental analysis to compensate for injection variablity.
- ***Isomer*** is a member of a group of compounds that differ from each other only in the locations of a specific number of common substituent atoms or groups of atoms on the parent compound.
- ***Method Blank*** is a laboratory control sample using reagents that are known to be free of contamination.
- ***Precision*** is the degree of agreement between the data generated from repetitive measurements under specific conditions.
- ***Quality Assurance*** is a system of activities whose purpose is to provide the producer or user of a product with the assurance that the product meets a defined standard of quality.
- ***Quality Control*** is the overall system of activities whose purpose is to control the quality of a product so that it meets the needs of the end user.
- ***RSD*** is the relative standard deviation.
- ***Blank Spike*** is a laboratory control sample that has been fortified with native analytes of interest.
- ***Window Defining Mixture*** is a solution containing only the earliest and latest eluting congeners within each homologous group of target analytes on a specified GC column.
- ***RPD*** or Relative Percent Difference. A measure used to compare duplicate sample analysis.
- ***EMPC/NDR*** – Peak detected does not meet ratio criteria and has resulted in a higher detection limit.

1.0 Project Narrative

Maxxam Analytics International
6740 Campobello Rd. Mississauga,
Ontario, Canada
L5N 2L8
1-800-668-0639
www.maxxamanalytics.com

PROJECT NARRATIVE

Maxxam Analytics
Client Project #: L&RR

Client: CEM Services Inc
Client Project: L&RR

I. SAMPLE RECEIPT/ANALYSIS

a) Sample Listing

Maxxam ID	Client Sample ID	Date Sampled	Date Received	Date Prepped	Date Run	Initial Calibration
2,3,7,8-TCDF Confirmation (M23)						
YT2089	M23-1	2014/12/02	2014/12/05	N/A	2014/12/16	2014/12/09
YT2091	M23-3	2014/12/03	2014/12/05	N/A	2014/12/16	2014/12/09
Dioxins/Furans in Air (Method 23)						
YT2089	M23-1	2014/12/02	2014/12/05	2014/12/11	2014/12/15	2014/07/25
YT2090	M23-2	2014/12/02	2014/12/05	2014/12/11	2014/12/15	2014/07/25
YT2091	M23-3	2014/12/03	2014/12/05	2014/12/11	2014/12/15	2014/07/25
PCBs by HRMS (1668A)						
YT2089	M23-1	2014/12/02	2014/12/05	2014/12/10	2014/12/15	2014/12/15
YT2090	M23-2	2014/12/02	2014/12/05	2014/12/10	2014/12/16	2014/12/15
YT2091	M23-3	2014/12/03	2014/12/05	2014/12/10	2014/12/16	2014/12/15

Run Date is defined as the date of injection of the last calibration standard (12 hours or less) prior to the samples analyzed within that run sequence. Therefore the time of calibration injection that defines the run date is always within 12 hours of the time of sample injection.

b) Shipping Problems: none encountered

c) Documentation Problems: none encountered

II. SAMPLE PREP:

No problems encountered

III. SAMPLE ANALYSIS:

See also comments within the appropriate Certificate of Analysis

a) Hold Times: all within recommended hold times

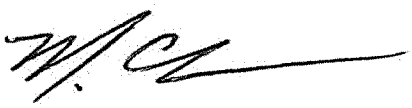
b) Instrument Calibration: all within control limits

c) Quality Control: All applicable QC meets control criteria, except where otherwise noted.

d) All analytes requiring manual intergration(s) are noted on the sample chromatograms

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for other than the conditions detailed above.

In addition, I certify, that to the best of my knowledge and belief, the data as reported are true and accurate. Release of the data contained in this data package has been authorized by the cognizant laboratory official or his/her designee, as verified by this signature.



Mike Challis, Customer Service Manager — 2015/01/20 Date

Maxxam
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2.0 Summary Report

Maxxam Analytics International
6740 Campobello Rd.
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Maxxam
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Success Through Science®

Your P.O. #: 74229
Your Project #: L&RR
Site Location: L&RR

Attention:Sean MacKay

CEM Services Inc
360 Old Colony Rd
Suite 1
Norton, MA
USA 02766

Report Date: 2014/12/18
Report #: R3261766
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B4N0984
Received: 2014/12/05, 13:30

Sample Matrix: Stack Sampling Train
Samples Received: 3

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Reference
2,3,7,8-TCDF Confirmation (M23)	2	N/A	2014/12/16	BRL SOP-00404	EPA M23/23A m
Dioxins/Furans in Air (Method 23)	3	2014/12/11	2014/12/15	BRL SOP-00404	EPA M23/23A m
PCBs by HRMS (1668A)	1	2014/12/10	2014/12/15	BRL SOP-00408	EPA 1668A/M0010 m
PCBs by HRMS (1668A)	2	2014/12/10	2014/12/16	BRL SOP-00408	EPA 1668A/M0010 m

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Clayton Johnson, Project Manager - Air Toxics, Source Evaluation
Email: CJohnson@maxxam.ca
Phone# (905)817-5769

==========

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Maxxam Job #: B4N0984
Report Date: 2014/12/18

CEM Services Inc
Client Project #: L&RR
Site Location: L&RR
Your P.O. #: 74229

EPA M23 DIOXINS AND FURANS (STACK SAMPLING TRAIN)

Maxxam ID		YT2089							
Sampling Date		2014/12/02 11:00				TOXIC EQUIVALENCY		# of	
	Units	M23-1	EDL	RDL	MDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
2,3,7,8-Tetra CDD *	pg	<3.1	3.1	30	6.0	1.00	3.10	N/A	3859768
1,2,3,7,8-Penta CDD *	pg	<3.2	3.2	30	6.0	1.00	3.20	N/A	3859768
1,2,3,4,7,8-Hexa CDD *	pg	<3.1	3.1	30	6.0	0.100	0.310	N/A	3859768
1,2,3,6,7,8-Hexa CDD *	pg	<3.2	3.2	30	6.0	0.100	0.320	N/A	3859768
1,2,3,7,8,9-Hexa CDD *	pg	<3.1	3.1	30	6.0	0.100	0.310	N/A	3859768
1,2,3,4,6,7,8-Hepta CDD *	pg	<3.0	3.0	30	9.0	0.0100	0.0300	N/A	3859768
1,2,3,4,6,7,8,9-Octa CDD *	pg	<4.8	4.8	300	9.0	0.000300	0.00144	N/A	3859768
Total Tetra CDD *	pg	<3.1	3.1	30	N/A	N/A	N/A	N/A	3859768
Total Penta CDD *	pg	<3.2	3.2	30	N/A	N/A	N/A	N/A	3859768
Total Hexa CDD *	pg	<5.1 (1)	5.1	30	N/A	N/A	N/A	N/A	3859768
Total Hepta CDD *	pg	<3.0	3.0	30	N/A	N/A	N/A	N/A	3859768
2,3,7,8-Tetra CDF **	pg	32.0	3.1	30	6.0	0.100	3.20	N/A	3859768
1,2,3,7,8-Penta CDF **	pg	<3.2	3.2	30	6.0	0.0300	0.0960	N/A	3859768
2,3,4,7,8-Penta CDF **	pg	<3.1	3.1	30	6.0	0.300	0.930	N/A	3859768
1,2,3,4,7,8-Hexa CDF **	pg	<3.1	3.1	30	6.0	0.100	0.310	N/A	3859768
1,2,3,6,7,8-Hexa CDF **	pg	<2.9	2.9	30	6.0	0.100	0.290	N/A	3859768
2,3,4,6,7,8-Hexa CDF **	pg	<3.4	3.4	30	6.0	0.100	0.340	N/A	3859768
1,2,3,7,8,9-Hexa CDF **	pg	<3.8	3.8	30	6.0	0.100	0.380	N/A	3859768
1,2,3,4,6,7,8-Hepta CDF **	pg	<2.9	2.9	30	9.0	0.0100	0.0290	N/A	3859768
1,2,3,4,7,8,9-Hepta CDF **	pg	<3.8	3.8	30	6.0	0.0100	0.0380	N/A	3859768
1,2,3,4,6,7,8,9-Octa CDF **	pg	<6.3	6.3	300	15	0.000300	0.00189	N/A	3859768
Total Tetra CDF **	pg	244	3.1	30	N/A	N/A	N/A	12	3859768
Total Penta CDF **	pg	14.8	3.2	30	N/A	N/A	N/A	1	3859768
Total Hexa CDF **	pg	<3.3	3.3	30	N/A	N/A	N/A	N/A	3859768
Total Hepta CDF **	pg	<3.3	3.3	30	N/A	N/A	N/A	N/A	3859768
Confirmation 2,3,7,8-Tetra CDF **	pg	8.6	3.1	30	N/A	0.100	0.860	N/A	3861708
TOTAL TOXIC EQUIVALENCY	pg	N/A	N/A	N/A	N/A	N/A	10.5	N/A	N/A

EDL = Estimated Detection Limit

RDL = Reportable Detection Limit

TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,
The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.

WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds

QC Batch = Quality Control Batch

* CDD = Chloro Dibenzo-p-Dioxin

N/A = Not Applicable

** CDF = Chloro Dibenzo-p-Furan

(1) EMPC / NDR - Peak detected does not meet ratio criteria and has resulted in an elevated detection limit.

Maxxam Job #: B4N0984
Report Date: 2014/12/18

CEM Services Inc
Client Project #: L&RR
Site Location: L&RR
Your P.O. #: 74229

EPA M23 DIOXINS AND FURANS (STACK SAMPLING TRAIN)

Maxxam ID		YT2089							
Sampling Date		2014/12/02 11:00				TOXIC EQUIVALENCY		# of	
	Units	M23-1	EDL	RDL	MDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
Surrogate Recovery (%)									
Confirmation C13-2378 TetraCDF **	%	94	N/A	N/A	N/A	N/A	N/A	N/A	3861708
C13-1234678 HeptaCDD *	%	69	N/A	N/A	N/A	N/A	N/A	N/A	3859768
C13-1234678 HeptaCDF **	%	76	N/A	N/A	N/A	N/A	N/A	N/A	3859768
C13-123478 HexaCDD *	%	95	N/A	N/A	N/A	N/A	N/A	N/A	3859768
C13-123478 HexaCDF **	%	75	N/A	N/A	N/A	N/A	N/A	N/A	3859768
C13-1234789 HeptaCDF **	%	84	N/A	N/A	N/A	N/A	N/A	N/A	3859768
C13-123678 HexaCDD *	%	78	N/A	N/A	N/A	N/A	N/A	N/A	3859768
C13-123678 HexaCDF **	%	108	N/A	N/A	N/A	N/A	N/A	N/A	3859768
C13-12378 PentaCDD *	%	93	N/A	N/A	N/A	N/A	N/A	N/A	3859768
C13-12378 PentaCDF **	%	118	N/A	N/A	N/A	N/A	N/A	N/A	3859768
C13-123789 HexaCDF **	%	72	N/A	N/A	N/A	N/A	N/A	N/A	3859768
C13-23478 PentaCDF **	%	80	N/A	N/A	N/A	N/A	N/A	N/A	3859768
C13-2378 TetraCDD *	%	84	N/A	N/A	N/A	N/A	N/A	N/A	3859768
C13-2378 TetraCDF **	%	82	N/A	N/A	N/A	N/A	N/A	N/A	3859768
C13-Octachlorodibenzo-p-Dioxin	%	57	N/A	N/A	N/A	N/A	N/A	N/A	3859768
Cl37-2378 TetraCDD *	%	96	N/A	N/A	N/A	N/A	N/A	N/A	3859768

EDL = Estimated Detection Limit

RDL = Reportable Detection Limit

TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,
The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.

WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds

QC Batch = Quality Control Batch

** CDF = Chloro Dibenzo-p-Furan

N/A = Not Applicable

* CDD = Chloro Dibenzo-p-Dioxin

Maxxam Job #: B4N0984
Report Date: 2014/12/18

CEM Services Inc
Client Project #: L&RR
Site Location: L&RR
Your P.O. #: 74229

EPA M23 DIOXINS AND FURANS (STACK SAMPLING TRAIN)

Maxxam ID		YT2090							
Sampling Date		2014/12/02 15:00				TOXIC EQUIVALENCY		# of	
	Units	M23-2	EDL	RDL	MDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
2,3,7,8-Tetra CDD *	pg	<3.1	3.1	30	6.0	1.00	3.10	N/A	3859768
1,2,3,7,8-Penta CDD *	pg	<3.1	3.1	30	6.0	1.00	3.10	N/A	3859768
1,2,3,4,7,8-Hexa CDD *	pg	<3.2	3.2	30	6.0	0.100	0.320	N/A	3859768
1,2,3,6,7,8-Hexa CDD *	pg	<3.3	3.3	30	6.0	0.100	0.330	N/A	3859768
1,2,3,7,8,9-Hexa CDD *	pg	<3.2	3.2	30	6.0	0.100	0.320	N/A	3859768
1,2,3,4,6,7,8-Hepta CDD *	pg	5.9	3.2	30	9.0	0.0100	0.0590	N/A	3859768
1,2,3,4,6,7,8,9-Octa CDD *	pg	20.4	4.5	300	9.0	0.000300	0.00612	N/A	3859768
Total Tetra CDD *	pg	<3.1	3.1	30	N/A	N/A	N/A	N/A	3859768
Total Penta CDD *	pg	<3.1	3.1	30	N/A	N/A	N/A	N/A	3859768
Total Hexa CDD *	pg	<3.7 (1)	3.7	30	N/A	N/A	N/A	N/A	3859768
Total Hepta CDD *	pg	10.7	3.2	30	N/A	N/A	N/A	2	3859768
2,3,7,8-Tetra CDF **	pg	7.7	3.0	30	6.0	0.100	0.770	N/A	3859768
1,2,3,7,8-Penta CDF **	pg	<3.2	3.2	30	6.0	0.0300	0.0960	N/A	3859768
2,3,4,7,8-Penta CDF **	pg	<3.0	3.0	30	6.0	0.300	0.900	N/A	3859768
1,2,3,4,7,8-Hexa CDF **	pg	<2.9	2.9	30	6.0	0.100	0.290	N/A	3859768
1,2,3,6,7,8-Hexa CDF **	pg	<2.7	2.7	30	6.0	0.100	0.270	N/A	3859768
2,3,4,6,7,8-Hexa CDF **	pg	<3.2	3.2	30	6.0	0.100	0.320	N/A	3859768
1,2,3,7,8,9-Hexa CDF **	pg	<3.6	3.6	30	6.0	0.100	0.360	N/A	3859768
1,2,3,4,6,7,8-Hepta CDF **	pg	<2.7	2.7	30	9.0	0.0100	0.0270	N/A	3859768
1,2,3,4,7,8,9-Hepta CDF **	pg	<3.6	3.6	30	6.0	0.0100	0.0360	N/A	3859768
1,2,3,4,6,7,8,9-Octa CDF **	pg	<4.0	4.0	300	15	0.000300	0.00120	N/A	3859768
Total Tetra CDF **	pg	13.6	3.0	30	N/A	N/A	N/A	2	3859768
Total Penta CDF **	pg	<3.1	3.1	30	N/A	N/A	N/A	N/A	3859768
Total Hexa CDF **	pg	<3.1	3.1	30	N/A	N/A	N/A	N/A	3859768
Total Hepta CDF **	pg	<3.1	3.1	30	N/A	N/A	N/A	N/A	3859768
TOTAL TOXIC EQUIVALENCY	pg	N/A	N/A	N/A	N/A	N/A	10.3	N/A	N/A

EDL = Estimated Detection Limit

RDL = Reportable Detection Limit

TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,
The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.

WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds

QC Batch = Quality Control Batch

* CDD = Chloro Dibenzo-p-Dioxin

N/A = Not Applicable

** CDF = Chloro Dibenzo-p-Furan

(1) EMPC / NDR - Peak detected does not meet ratio criteria and has resulted in an elevated detection limit.

Maxxam Job #: B4N0984
Report Date: 2014/12/18

CEM Services Inc
Client Project #: L&RR
Site Location: L&RR
Your P.O. #: 74229

EPA M23 DIOXINS AND FURANS (STACK SAMPLING TRAIN)

Maxxam ID		YT2090							
Sampling Date		2014/12/02 15:00				TOXIC EQUIVALENCY		# of	
	Units	M23-2	EDL	RDL	MDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
Surrogate Recovery (%)									
C13-1234678 HeptaCDD *	%	65	N/A	N/A	N/A	N/A	N/A	N/A	3859768
C13-1234678 HeptaCDF **	%	73	N/A	N/A	N/A	N/A	N/A	N/A	3859768
C13-123478 HexaCDD *	%	92	N/A	N/A	N/A	N/A	N/A	N/A	3859768
C13-123478 HexaCDF **	%	79	N/A	N/A	N/A	N/A	N/A	N/A	3859768
C13-1234789 HeptaCDF **	%	82	N/A	N/A	N/A	N/A	N/A	N/A	3859768
C13-123678 HexaCDD *	%	76	N/A	N/A	N/A	N/A	N/A	N/A	3859768
C13-123678 HexaCDF **	%	99	N/A	N/A	N/A	N/A	N/A	N/A	3859768
C13-12378 PentaCDD *	%	85	N/A	N/A	N/A	N/A	N/A	N/A	3859768
C13-12378 PentaCDF **	%	106	N/A	N/A	N/A	N/A	N/A	N/A	3859768
C13-123789 HexaCDF **	%	70	N/A	N/A	N/A	N/A	N/A	N/A	3859768
C13-23478 PentaCDF **	%	82	N/A	N/A	N/A	N/A	N/A	N/A	3859768
C13-2378 TetraCDD *	%	87	N/A	N/A	N/A	N/A	N/A	N/A	3859768
C13-2378 TetraCDF **	%	84	N/A	N/A	N/A	N/A	N/A	N/A	3859768
C13-Octachlorodibenzo-p-Dioxin	%	53	N/A	N/A	N/A	N/A	N/A	N/A	3859768
Cl37-2378 TetraCDD *	%	97	N/A	N/A	N/A	N/A	N/A	N/A	3859768

EDL = Estimated Detection Limit

RDL = Reportable Detection Limit

TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,
The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.

WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds

QC Batch = Quality Control Batch

* CDD = Chloro Dibenzo-p-Dioxin

N/A = Not Applicable

** CDF = Chloro Dibenzo-p-Furan

Maxxam Job #: B4N0984
Report Date: 2014/12/18

CEM Services Inc
Client Project #: L&RR
Site Location: L&RR
Your P.O. #: 74229

EPA M23 DIOXINS AND FURANS (STACK SAMPLING TRAIN)

Maxxam ID		YT2091							
Sampling Date		2014/12/03 09:00				TOXIC EQUIVALENCY		# of	
	Units	M23-3	EDL	RDL	MDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
2,3,7,8-Tetra CDD *	pg	5.4 (1)	3.2	30	6.0	1.00	5.40	N/A	3859768
1,2,3,7,8-Penta CDD *	pg	5.8	3.0	30	6.0	1.00	5.80	N/A	3859768
1,2,3,4,7,8-Hexa CDD *	pg	<3.0	3.0	30	6.0	0.100	0.300	N/A	3859768
1,2,3,6,7,8-Hexa CDD *	pg	4.9	3.1	30	6.0	0.100	0.490	N/A	3859768
1,2,3,7,8,9-Hexa CDD *	pg	3.8 (1)	3.0	30	6.0	0.100	0.380	N/A	3859768
1,2,3,4,6,7,8-Hepta CDD *	pg	15.5	3.1	30	9.0	0.0100	0.155	N/A	3859768
1,2,3,4,6,7,8,9-Octa CDD *	pg	24.1	3.4	300	9.0	0.000300	0.00723	N/A	3859768
Total Tetra CDD *	pg	178	3.2	30	N/A	N/A	N/A	12	3859768
Total Penta CDD *	pg	87.1	3.0	30	N/A	N/A	N/A	9	3859768
Total Hexa CDD *	pg	63.3	3.0	30	N/A	N/A	N/A	5	3859768
Total Hepta CDD *	pg	30.8	3.1	30	N/A	N/A	N/A	2	3859768
2,3,7,8-Tetra CDF **	pg	<230 (2)	230	30	6.0	0.100	23.0	N/A	3859768
1,2,3,7,8-Penta CDF **	pg	18.2	3.2	30	6.0	0.0300	0.546	N/A	3859768
2,3,4,7,8-Penta CDF **	pg	20.5	3.1	30	6.0	0.300	6.15	N/A	3859768
1,2,3,4,7,8-Hexa CDF **	pg	25.2	2.9	30	6.0	0.100	2.52	N/A	3859768
1,2,3,6,7,8-Hexa CDF **	pg	11.4	2.7	30	6.0	0.100	1.14	N/A	3859768
2,3,4,6,7,8-Hexa CDF **	pg	8.1	3.1	30	6.0	0.100	0.810	N/A	3859768
1,2,3,7,8,9-Hexa CDF **	pg	<3.5	3.5	30	6.0	0.100	0.350	N/A	3859768
1,2,3,4,6,7,8-Hepta CDF **	pg	23.9	2.7	30	9.0	0.0100	0.239	N/A	3859768
1,2,3,4,7,8,9-Hepta CDF **	pg	3.9	3.6	30	6.0	0.0100	0.0390	N/A	3859768
1,2,3,4,6,7,8,9-Octa CDF **	pg	5.8	3.3	300	15	0.000300	0.00174	N/A	3859768
Total Tetra CDF **	pg	1510	3.0	30	N/A	N/A	N/A	15	3859768
Total Penta CDF **	pg	294	3.1	30	N/A	N/A	N/A	11	3859768
Total Hexa CDF **	pg	83.2	3.0	30	N/A	N/A	N/A	5	3859768
Total Hepta CDF **	pg	36.7	3.1	30	N/A	N/A	N/A	4	3859768

EDL = Estimated Detection Limit

RDL = Reportable Detection Limit

TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,
The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.

WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds

QC Batch = Quality Control Batch

* CDD = Chloro Dibenzo-p-Dioxin

N/A = Not Applicable

** CDF = Chloro Dibenzo-p-Furan

(1) EMPC / Ratio - Isotopic ratio adjusted to meet theoretical

(2) RT > 3 seconds - PCDD/DF analysis - Peak detected exceeds expected retention time (from internal standard) by greater than 3 seconds.

Maxxam Job #: B4N0984
Report Date: 2014/12/18

CEM Services Inc
Client Project #: L&RR
Site Location: L&RR
Your P.O. #: 74229

EPA M23 DIOXINS AND FURANS (STACK SAMPLING TRAIN)

Maxxam ID		YT2091							
Sampling Date		2014/12/03 09:00				TOXIC EQUIVALENCY		# of	
	Units	M23-3	EDL	RDL	MDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
Confirmation 2,3,7,8-Tetra CDF **	pg	40.9	2.2	30	N/A	0.100	4.09	N/A	3861708
TOTAL TOXIC EQUIVALENCY	pg	N/A	N/A	N/A	N/A	N/A	28.4	N/A	N/A
Surrogate Recovery (%)									
Confirmation C13-2378 TetraCDF **	%	95	N/A	N/A	N/A	N/A	N/A	N/A	3861708
C13-1234678 HeptaCDD *	%	80	N/A	N/A	N/A	N/A	N/A	N/A	3859768
C13-1234678 HeptaCDF **	%	91	N/A	N/A	N/A	N/A	N/A	N/A	3859768
C13-123478 HexaCDD *	%	98	N/A	N/A	N/A	N/A	N/A	N/A	3859768
C13-123478 HexaCDF **	%	78	N/A	N/A	N/A	N/A	N/A	N/A	3859768
C13-1234789 HeptaCDF **	%	87	N/A	N/A	N/A	N/A	N/A	N/A	3859768
C13-123678 HexaCDD *	%	88	N/A	N/A	N/A	N/A	N/A	N/A	3859768
C13-123678 HexaCDF **	%	120	N/A	N/A	N/A	N/A	N/A	N/A	3859768
C13-12378 PentaCDD *	%	94	N/A	N/A	N/A	N/A	N/A	N/A	3859768
C13-12378 PentaCDF **	%	120	N/A	N/A	N/A	N/A	N/A	N/A	3859768
C13-123789 HexaCDF **	%	82	N/A	N/A	N/A	N/A	N/A	N/A	3859768
C13-23478 PentaCDF **	%	80	N/A	N/A	N/A	N/A	N/A	N/A	3859768
C13-2378 TetraCDD *	%	91	N/A	N/A	N/A	N/A	N/A	N/A	3859768
C13-2378 TetraCDF **	%	93	N/A	N/A	N/A	N/A	N/A	N/A	3859768
C13-Octachlorodibenzo-p-Dioxin	%	69	N/A	N/A	N/A	N/A	N/A	N/A	3859768
Cl37-2378 TetraCDD *	%	100	N/A	N/A	N/A	N/A	N/A	N/A	3859768

EDL = Estimated Detection Limit

RDL = Reportable Detection Limit

TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,
The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.

WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds

QC Batch = Quality Control Batch

** CDF = Chloro Dibenzo-p-Furan

N/A = Not Applicable

* CDD = Chloro Dibenzo-p-Dioxin

Maxxam Job #: B4N0984
Report Date: 2014/12/18

CEM Services Inc
Client Project #: L&RR
Site Location: L&RR
Your P.O. #: 74229

RESULTS OF ANALYSES OF STACK SAMPLING TRAIN

Maxxam ID		YT2089							
Sampling Date		2014/12/02 11:00				TOXIC EQUIVALENCY		# of	
	Units	M23-1	EDL	RDL	MDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
2-MonoCB-(1)	ng	<7.5 (1)	7.5	0.30	N/A	N/A	N/A	N/A	3855382
3-MonoCB-(2)	ng	9.58	0.17	0.30	N/A	N/A	N/A	N/A	3855382
4-MonoCB-(3)	ng	5.62	0.17	0.30	N/A	N/A	N/A	N/A	3855382
22'-DiCB-(4)	ng	14.2	0.056	0.30	N/A	N/A	N/A	N/A	3855382
2,3-DiCB-(5)	ng	0.897	0.093	0.30	N/A	N/A	N/A	N/A	3855382
2,3'-DiCB-(6)	ng	2.82	0.083	0.30	N/A	N/A	N/A	N/A	3855382
2,4-DiCB-(7)	ng	0.657	0.088	0.30	N/A	N/A	N/A	N/A	3855382
2,4'-DiCB-(8)	ng	10.4	0.079	0.30	N/A	N/A	N/A	N/A	3855382
2,5-DiCB-(9)	ng	1.75	0.081	0.30	N/A	N/A	N/A	N/A	3855382
2,6-DiCB-(10)	ng	0.380	0.055	0.30	N/A	N/A	N/A	N/A	3855382
3,3'-DiCB-(11)	ng	1.27	0.085	0.30	N/A	N/A	N/A	N/A	3855382
DiCB-(12)+(13)	ng	3.57	0.087	0.60	N/A	N/A	N/A	N/A	3855382
3,5-DiCB-(14)	ng	0.238	0.082	0.30	N/A	N/A	N/A	N/A	3855382
4,4'-DiCB-(15)	ng	1.54	0.14	0.30	N/A	N/A	N/A	N/A	3855382
22'3-TriCB-(16)	ng	2.09	0.076	0.30	N/A	N/A	N/A	N/A	3855382
22'4-TriCB-(17)	ng	3.20	0.062	0.30	N/A	N/A	N/A	N/A	3855382
TriCB-(18)+(30)	ng	6.36	0.052	0.60	N/A	N/A	N/A	N/A	3855382
22'6-TriCB-(19)	ng	1.71	0.055	0.30	N/A	N/A	N/A	N/A	3855382
TriCB-(20) + (28)	ng	3.01	0.030	0.60	N/A	N/A	N/A	N/A	3855382
TriCB-(21)+(33)	ng	2.12	0.032	0.60	N/A	N/A	N/A	N/A	3855382
234'-TriCB-(22)	ng	0.939	0.034	0.30	N/A	N/A	N/A	N/A	3855382
235-TriCB-(23)	ng	<0.036	0.036	0.30	N/A	N/A	N/A	N/A	3855382
236-TriCB-(24)	ng	0.169	0.049	0.30	N/A	N/A	N/A	N/A	3855382
23'4-TriCB-(25)	ng	0.296	0.029	0.30	N/A	N/A	N/A	N/A	3855382
TriCB-(26)+(29)	ng	0.774	0.031	0.60	N/A	N/A	N/A	N/A	3855382
23'6-TriCB-(27)	ng	0.398	0.043	0.30	N/A	N/A	N/A	N/A	3855382
24'5-TriCB-(31)	ng	3.03	0.029	0.30	N/A	N/A	N/A	N/A	3855382
24'6-TriCB-(32)	ng	1.44	0.040	0.30	N/A	N/A	N/A	N/A	3855382

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(1) EMPC / NDR - Peak detected does not meet ratio criteria and has resulted in an elevated detection limit.

Maxxam Job #: B4N0984
Report Date: 2014/12/18

CEM Services Inc
Client Project #: L&RR
Site Location: L&RR
Your P.O. #: 74229

RESULTS OF ANALYSES OF STACK SAMPLING TRAIN

Maxxam ID		YT2089							
Sampling Date		2014/12/02 11:00				TOXIC EQUIVALENCY		# of	
	Units	M23-1	EDL	RDL	MDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
23'5'-TriCB-(34)	ng	<0.030	0.030	0.30	N/A	N/A	N/A	N/A	3855382
33'4-TriCB-(35)	ng	0.198	0.030	0.30	N/A	N/A	N/A	N/A	3855382
33'5-TriCB-(36)	ng	<0.027	0.027	0.30	N/A	N/A	N/A	N/A	3855382
344'-TriCB-(37)	ng	0.211	0.048	0.30	N/A	N/A	N/A	N/A	3855382
345-TriCB-(38)	ng	<0.062 (1)	0.062	0.30	N/A	N/A	N/A	N/A	3855382
34'5-TriCB-(39)	ng	<0.031	0.031	0.30	N/A	N/A	N/A	N/A	3855382
TetraCB-(40)+(41)+(71)	ng	0.33	0.10	0.90	N/A	N/A	N/A	N/A	3855382
22'34'-TetraCB-(42)	ng	0.19	0.12	0.30	N/A	N/A	N/A	N/A	3855382
22'35-TetraCB-(43)	ng	<0.14	0.14	0.30	N/A	N/A	N/A	N/A	3855382
TetraCB-(44)+(47)+(65)	ng	0.793	0.095	0.90	N/A	N/A	N/A	N/A	3855382
TetraCB-(45)+(51)	ng	0.46	0.10	0.60	N/A	N/A	N/A	N/A	3855382
22'36'-TetraCB-(46)	ng	0.13	0.12	0.30	N/A	N/A	N/A	N/A	3855382
22'45-TetraCB-(48)	ng	0.26	0.11	0.30	N/A	N/A	N/A	N/A	3855382
TetraCB-(49)+TetraCB-(69)	ng	0.552	0.088	0.60	N/A	N/A	N/A	N/A	3855382
TetraCB-(50)+(53)	ng	0.393	0.099	0.60	N/A	N/A	N/A	N/A	3855382
22'55'-TetraCB-(52)	ng	1.08	0.10	0.30	N/A	N/A	N/A	N/A	3855382
22'66'-TetraCB-(54)	ng	<0.047	0.047	0.30	N/A	N/A	N/A	N/A	3855382
233'4-TetraCB-(55)	ng	<0.045	0.045	0.30	N/A	N/A	N/A	N/A	3855382
233'4'-Tetra CB(56)	ng	<0.046	0.046	0.30	N/A	N/A	N/A	N/A	3855382
233'5-TetraCB-(57)	ng	<0.042	0.042	0.30	N/A	N/A	N/A	N/A	3855382
233'5'-TetraCB-(58)	ng	<0.043	0.043	0.30	N/A	N/A	N/A	N/A	3855382
TetraCB-(59)+(62)+(75)	ng	<0.074	0.074	0.90	N/A	N/A	N/A	N/A	3855382
2344'-TetraCB -(60)	ng	<0.046	0.046	0.30	N/A	N/A	N/A	N/A	3855382
TetraCB-(61)+(70)+(74)+(76)	ng	0.280	0.043	1.2	N/A	N/A	N/A	N/A	3855382
234'5-TetraCB-(63)	ng	<0.039	0.039	0.30	N/A	N/A	N/A	N/A	3855382
234'6-TetraCB-(64)	ng	0.220	0.078	0.30	N/A	N/A	N/A	N/A	3855382
23'44'-TetraCB-(66)	ng	0.105	0.041	0.30	N/A	N/A	N/A	N/A	3855382
23'45-TetraCB-(67)	ng	<0.038	0.038	0.30	N/A	N/A	N/A	N/A	3855382

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CEM Services Inc
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Site Location: L&RR
Your P.O. #: 74229

RESULTS OF ANALYSES OF STACK SAMPLING TRAIN

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Sampling Date		2014/12/02 11:00				TOXIC EQUIVALENCY		# of	
	Units	M23-1	EDL	RDL	MDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
23'45'-TetraCB-(68)	ng	<0.040	0.040	0.30	N/A	N/A	N/A	N/A	3855382
23'55'-TetraCB-(72)	ng	<0.039	0.039	0.30	N/A	N/A	N/A	N/A	3855382
23'5'6-TetraCB-(73)	ng	<0.072	0.072	0.30	N/A	N/A	N/A	N/A	3855382
33'44'-TetraCB-(77)	ng	<0.048	0.048	0.30	N/A	0.000100	0.00000480	N/A	3855382
33'45-TetraCB-(78)	ng	<0.041	0.041	0.30	N/A	N/A	N/A	N/A	3855382
33'45'-TetraCB(79)	ng	<0.036	0.036	0.30	N/A	N/A	N/A	N/A	3855382
33'55'-TetraCB-(80)	ng	<0.037	0.037	0.30	N/A	N/A	N/A	N/A	3855382
344'5-TetraCB-(81)	ng	<0.050	0.050	0.30	N/A	0.000300	0.0000150	N/A	3855382
22'33'4-PentaCB-(82)	ng	<0.094	0.094	0.30	N/A	N/A	N/A	N/A	3855382
PentaCB-(83)+(99)	ng	<0.086	0.086	0.60	N/A	N/A	N/A	N/A	3855382
22'33'6-PentaCB-(84)	ng	<0.093	0.093	0.30	N/A	N/A	N/A	N/A	3855382
PentaCB-(85)+(116)+(117)	ng	<0.064	0.064	0.90	N/A	N/A	N/A	N/A	3855382
PentaCB-(86)(87)(97)(109)(119)(125)	ng	<0.070	0.070	1.8	N/A	N/A	N/A	N/A	3855382
PentaCB-(88)+(91)	ng	<0.083	0.083	0.60	N/A	N/A	N/A	N/A	3855382
22'346'-PentaCB-(89)	ng	<0.086	0.086	0.30	N/A	N/A	N/A	N/A	3855382
PentaCB-(90)+(101)+(113)	ng	0.115	0.069	0.90	N/A	N/A	N/A	N/A	3855382
22'355'-PentaCB-(92)	ng	<0.082	0.082	0.30	N/A	N/A	N/A	N/A	3855382
PentaCB-(93)+(98)+(100)+(102)	ng	<0.084	0.084	1.2	N/A	N/A	N/A	N/A	3855382
22'356'-PentaCB-(94)	ng	<0.094	0.094	0.30	N/A	N/A	N/A	N/A	3855382
22'35'6-PentaCB-(95)	ng	0.184	0.076	0.30	N/A	N/A	N/A	N/A	3855382
22'366'-PentaCB-(96)	ng	<0.026	0.026	0.30	N/A	N/A	N/A	N/A	3855382
22'45'6-PentaCB-(103)	ng	<0.071	0.071	0.30	N/A	N/A	N/A	N/A	3855382
22'466'-PentaCB-(104)	ng	<0.023	0.023	0.30	N/A	N/A	N/A	N/A	3855382
233'44'-PentaCB-(105)	ng	<0.052	0.052	0.30	N/A	0.0000300	0.00000156	N/A	3855382
233'45-PentaCB-(106)	ng	<0.043	0.043	0.30	N/A	N/A	N/A	N/A	3855382
233'4'5-PentaCB-(107)	ng	<0.039	0.039	0.30	N/A	N/A	N/A	N/A	3855382
PentaCB-(108)+(124)	ng	<0.044	0.044	0.60	N/A	N/A	N/A	N/A	3855382
PentaCB-(110)+(115)	ng	0.094	0.066	0.60	N/A	N/A	N/A	N/A	3855382
233'55'-PentaCB-(111)	ng	<0.061	0.061	0.30	N/A	N/A	N/A	N/A	3855382

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CEM Services Inc
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RESULTS OF ANALYSES OF STACK SAMPLING TRAIN

Maxxam ID		YT2089							
Sampling Date		2014/12/02 11:00				TOXIC EQUIVALENCY		# of	
	Units	M23-1	EDL	RDL	MDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
233'56-PentaCB-(112)	ng	<0.058	0.058	0.30	N/A	N/A	N/A	N/A	3855382
2344'5-PentaCB-(114)	ng	<0.050	0.050	0.30	N/A	0.0000300	0.00000150	N/A	3855382
23'44'5-PentaCB-(118)	ng	<0.051	0.051	0.30	N/A	0.0000300	0.00000153	N/A	3855382
23'455'-PentaCB-(120)	ng	<0.055	0.055	0.30	N/A	N/A	N/A	N/A	3855382
23'45'6-PentaCB-(121)	ng	<0.062	0.062	0.30	N/A	N/A	N/A	N/A	3855382
233'4'5'-PentaCB-(122)	ng	<0.047	0.047	0.30	N/A	N/A	N/A	N/A	3855382
23'44'5'-PentaCB-(123)	ng	<0.056	0.056	0.30	N/A	0.0000300	0.00000168	N/A	3855382
33'44'5-PentaCB-(126)	ng	<0.051	0.051	0.30	N/A	0.100	0.00510	N/A	3855382
33'455'-PentaCB-(127)	ng	<0.043	0.043	0.30	N/A	N/A	N/A	N/A	3855382
HexaCB-(128)+(166)	ng	<0.11	0.11	0.60	N/A	N/A	N/A	N/A	3855382
HexaCB-(129)+(138)+(163)	ng	<0.12	0.12	0.90	N/A	N/A	N/A	N/A	3855382
22'33'45'-HexaCB-(130)	ng	<0.14	0.14	0.30	N/A	N/A	N/A	N/A	3855382
22'33'46-HexaCB-(131)	ng	<0.14	0.14	0.30	N/A	N/A	N/A	N/A	3855382
22'33'46'-HexaCB-(132)	ng	<0.14	0.14	0.30	N/A	N/A	N/A	N/A	3855382
22'33'55'-HexaCB-(133)	ng	<0.12	0.12	0.30	N/A	N/A	N/A	N/A	3855382
HexaCB-(134)+(143)	ng	<0.14	0.14	0.60	N/A	N/A	N/A	N/A	3855382
HexaCB-(135)+(151)	ng	<0.067	0.067	0.60	N/A	N/A	N/A	N/A	3855382
22'33'66'-HexaCB-(136)	ng	<0.047	0.047	0.30	N/A	N/A	N/A	N/A	3855382
22'344'5-HexaCB-(137)	ng	<0.13	0.13	0.30	N/A	N/A	N/A	N/A	3855382
HexaCB-(139)+(140)	ng	<0.11	0.11	0.60	N/A	N/A	N/A	N/A	3855382
22'3455'-HexaCB-(141)	ng	<0.12	0.12	0.30	N/A	N/A	N/A	N/A	3855382
22'3456-HexaCB-(142)	ng	<0.14	0.14	0.30	N/A	N/A	N/A	N/A	3855382
22'345'6-HexaCB-(144)	ng	<0.063	0.063	0.30	N/A	N/A	N/A	N/A	3855382
22'3466'-HexaCB-(145)	ng	<0.052	0.052	0.30	N/A	N/A	N/A	N/A	3855382
22'34'55'-HexaCB-(146)	ng	<0.11	0.11	0.30	N/A	N/A	N/A	N/A	3855382
HexaCB-(147)+(149)	ng	<0.11	0.11	0.60	N/A	N/A	N/A	N/A	3855382
22'34'56'-HexaCB-(148)	ng	<0.064	0.064	0.30	N/A	N/A	N/A	N/A	3855382
22'34'66'-HexaCB-(150)	ng	<0.049	0.049	0.30	N/A	N/A	N/A	N/A	3855382
22'3566'-HexaCB-(152)	ng	<0.045	0.045	0.30	N/A	N/A	N/A	N/A	3855382

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CEM Services Inc
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RESULTS OF ANALYSES OF STACK SAMPLING TRAIN

Maxxam ID		YT2089							
Sampling Date		2014/12/02 11:00				TOXIC EQUIVALENCY		# of	
	Units	M23-1	EDL	RDL	MDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
HexaCB-(153)+(168)	ng	<0.095	0.095	0.60	N/A	N/A	N/A	N/A	3855382
22'44'56'-HexaCB-(154)	ng	<0.054	0.054	0.30	N/A	N/A	N/A	N/A	3855382
22'44'66'-HexaCB-(155)	ng	<0.048	0.048	0.30	N/A	N/A	N/A	N/A	3855382
HexaCB-(156)+(157)	ng	<0.018	0.018	0.60	N/A	0.0000300	0.000000540	N/A	3855382
233'44'6-HexaCB-(158)	ng	<0.081	0.081	0.30	N/A	N/A	N/A	N/A	3855382
233'455'-HexaCB-(159)	ng	<0.017	0.017	0.30	N/A	N/A	N/A	N/A	3855382
233'456-HexaCB-(160)	ng	<0.099	0.099	0.30	N/A	N/A	N/A	N/A	3855382
233'45'6-HexaCB-(161)	ng	<0.089	0.089	0.30	N/A	N/A	N/A	N/A	3855382
233'4'55'-HexaCB-(162)	ng	<0.017	0.017	0.30	N/A	N/A	N/A	N/A	3855382
233'4'5'6-HexaCB-(164)	ng	<0.087	0.087	0.30	N/A	N/A	N/A	N/A	3855382
233'55'6-HexaCB-(165)	ng	<0.10	0.10	0.30	N/A	N/A	N/A	N/A	3855382
23'44'55'-HexaCB-(167)	ng	<0.019	0.019	0.30	N/A	0.0000300	0.000000570	N/A	3855382
33'44'55'-HexaCB-(169)	ng	<0.020	0.020	0.30	N/A	0.0300	0.000600	N/A	3855382
22'33'44'5-HeptaCB-(170)	ng	<0.027	0.027	0.30	N/A	N/A	N/A	N/A	3855382
HeptaCB-(171)+(173)	ng	<0.041	0.041	0.60	N/A	N/A	N/A	N/A	3855382
22'33'455'-HeptaCB-(172)	ng	<0.042	0.042	0.30	N/A	N/A	N/A	N/A	3855382
22'33'456'-HeptaCB-(174)	ng	<0.039	0.039	0.30	N/A	N/A	N/A	N/A	3855382
22'33'45'6-HeptaCB-(175)	ng	<0.019	0.019	0.30	N/A	N/A	N/A	N/A	3855382
22'33'466'-HeptaCB-(176)	ng	<0.014	0.014	0.30	N/A	N/A	N/A	N/A	3855382
22'33'45'6'-HeptaCB-(177)	ng	<0.041	0.041	0.30	N/A	N/A	N/A	N/A	3855382
22'33'55'6-HeptaCB-(178)	ng	<0.020	0.020	0.30	N/A	N/A	N/A	N/A	3855382
22'33'566'-HeptaCB-(179)	ng	<0.013	0.013	0.30	N/A	N/A	N/A	N/A	3855382
HeptaCB-(180)+(193)	ng	<0.026	0.026	0.60	N/A	N/A	N/A	N/A	3855382
22'344'56-HeptaCB-(181)	ng	<0.041	0.041	0.30	N/A	N/A	N/A	N/A	3855382
22'344'56'-HeptaCB-(182)	ng	<0.019	0.019	0.30	N/A	N/A	N/A	N/A	3855382
22'344'5'6-HeptaCB-(183)	ng	<0.034	0.034	0.30	N/A	N/A	N/A	N/A	3855382
22'344'66'-HeptaCB-(184)	ng	<0.014	0.014	0.30	N/A	N/A	N/A	N/A	3855382
22'3455'6-HeptaCB-(185)	ng	<0.042	0.042	0.30	N/A	N/A	N/A	N/A	3855382
22'34566'-HeptaCB-(186)	ng	<0.015	0.015	0.30	N/A	N/A	N/A	N/A	3855382

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	Units	M23-1	EDL	RDL	MDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
22'34'55'6-HeptaCB-(187)	ng	<0.019	0.019	0.30	N/A	N/A	N/A	N/A	3855382
22'34'566'-HeptaCB-(188)	ng	<0.015	0.015	0.30	N/A	N/A	N/A	N/A	3855382
233'44'55'-HeptaCB-(189)	ng	<0.017	0.017	0.30	N/A	0.0000300	0.000000510	N/A	3855382
233'44'56-HeptaCB-(190)	ng	<0.030	0.030	0.30	N/A	N/A	N/A	N/A	3855382
233'44'5'6-HeptaCB-(191)	ng	<0.029	0.029	0.30	N/A	N/A	N/A	N/A	3855382
233'455'6-HeptaCB-(192)	ng	<0.034	0.034	0.30	N/A	N/A	N/A	N/A	3855382
22'33'44'55'-OctaCB-(194)	ng	<0.015	0.015	0.30	N/A	N/A	N/A	N/A	3855382
22'33'44'56-OctaCB-(195)	ng	<0.016	0.016	0.30	N/A	N/A	N/A	N/A	3855382
22'33'44'56'-OctaCB-(196)	ng	<0.025	0.025	0.30	N/A	N/A	N/A	N/A	3855382
22'33'44'66'OctaCB-(197)	ng	<0.020	0.020	0.30	N/A	N/A	N/A	N/A	3855382
OctaCB-(198)+(199)	ng	<0.026	0.026	0.60	N/A	N/A	N/A	N/A	3855382
22'33'4566'-OctaCB-(200)	ng	<0.017	0.017	0.30	N/A	N/A	N/A	N/A	3855382
22'33'45'66'-OctaCB-(201)	ng	<0.018	0.018	0.30	N/A	N/A	N/A	N/A	3855382
22'33'55'66'-OctaCB-(202)	ng	<0.021	0.021	0.30	N/A	N/A	N/A	N/A	3855382
22'344'55'6-OctaCB-(203)	ng	<0.025	0.025	0.30	N/A	N/A	N/A	N/A	3855382
22'344'566'-OctaCB-(204)	ng	<0.018	0.018	0.30	N/A	N/A	N/A	N/A	3855382
233'44'55'6-OctaCB-(205)	ng	<0.012	0.012	0.30	N/A	N/A	N/A	N/A	3855382
22'33'44'55'6-NonaCB-(206)	ng	<0.026	0.026	0.30	N/A	N/A	N/A	N/A	3855382
22'33'44'566'-NonaCB-(207)	ng	<0.020	0.020	0.30	N/A	N/A	N/A	N/A	3855382
22'33'455'66'-NonaCB-(208)	ng	<0.024	0.024	0.30	N/A	N/A	N/A	N/A	3855382
DecaCB-(209)	ng	<0.026	0.026	0.30	N/A	N/A	N/A	N/A	3855382
Monochlorobiphenyl	ng	15.2	0.18	N/A	N/A	N/A	N/A	2	3855382
Dichlorobiphenyl	ng	37.7	0.14	N/A	N/A	N/A	N/A	11	3855382
Trichlorobiphenyl	ng	25.9	0.076	N/A	N/A	N/A	N/A	15	3855382
Tetrachlorobiphenyl	ng	4.81	0.14	N/A	N/A	N/A	N/A	12	3855382
Pentachlorobiphenyl	ng	0.392	0.094	N/A	N/A	N/A	N/A	3	3855382
Hexachlorobiphenyl	ng	<0.14	0.14	N/A	N/A	N/A	N/A	N/A	3855382
Heptachlorobiphenyl	ng	<0.042	0.042	N/A	N/A	N/A	N/A	N/A	3855382
Octachlorobiphenyl	ng	<0.026	0.026	N/A	N/A	N/A	N/A	N/A	3855382

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N/A = Not Applicable

Maxxam Job #: B4N0984
Report Date: 2014/12/18

CEM Services Inc
Client Project #: L&RR
Site Location: L&RR
Your P.O. #: 74229

RESULTS OF ANALYSES OF STACK SAMPLING TRAIN

Maxxam ID		YT2089							
Sampling Date		2014/12/02 11:00				TOXIC EQUIVALENCY		# of	
	Units	M23-1	EDL	RDL	MDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
Nonachlorobiphenyl	ng	<0.026	0.026	N/A	N/A	N/A	N/A	N/A	3855382
Decachlorobiphenyl	ng	<0.026	0.026	N/A	N/A	N/A	N/A	N/A	3855382
TOTAL TOXIC EQUIVALENCY	ng	N/A	N/A	N/A	N/A	N/A	0.00573	N/A	N/A
Surrogate Recovery (%)									
C13-2,2',3,5',6-PentaCB(95) (FS)	%	86	N/A	N/A	N/A	N/A	N/A	N/A	3855382
C13-2,44'-TriCB-(28)	%	93	N/A	N/A	N/A	N/A	N/A	N/A	3855382
C13-2,4'5-TriCB-(31) (FS)	%	78	N/A	N/A	N/A	N/A	N/A	N/A	3855382
C13-22'33'44'55'6-NonaCB-(206)	%	123	N/A	N/A	N/A	N/A	N/A	N/A	3855382
C13-22'33'44'5-HeptaCB-(170)	%	94	N/A	N/A	N/A	N/A	N/A	N/A	3855382
C13-22'33'455'66'-NonaCB-(208)	%	108	N/A	N/A	N/A	N/A	N/A	N/A	3855382
C13-22'33'55'66'-OctaCB-(202)	%	105	N/A	N/A	N/A	N/A	N/A	N/A	3855382
C13-22'33'55'6-HeptaCB-(178)	%	118	N/A	N/A	N/A	N/A	N/A	N/A	3855382
C13-22'344'55'-HeptaCB-(180)	%	94	N/A	N/A	N/A	N/A	N/A	N/A	3855382
C13-22'34'566'-HeptaCB-(188)	%	105	N/A	N/A	N/A	N/A	N/A	N/A	3855382
C13-22'44'55'HexaCB-(153) (FS)	%	90	N/A	N/A	N/A	N/A	N/A	N/A	3855382
C13-22'44'66'-HexaCB-(155)	%	98	N/A	N/A	N/A	N/A	N/A	N/A	3855382
C13-22'466'-PentaCB-(104)	%	105	N/A	N/A	N/A	N/A	N/A	N/A	3855382
C13-22'66'-TetraCB-(54)	%	62	N/A	N/A	N/A	N/A	N/A	N/A	3855382
C13-22'6-TriCB-(19)	%	71	N/A	N/A	N/A	N/A	N/A	N/A	3855382
C13-22'-DiCB-(4)	%	41	N/A	N/A	N/A	N/A	N/A	N/A	3855382
C13-233'44'55'6-OctaCB-(205)	%	113	N/A	N/A	N/A	N/A	N/A	N/A	3855382
C13-233'44'55'-HeptaCB-(189)	%	98	N/A	N/A	N/A	N/A	N/A	N/A	3855382
C13-233'44'-PentaCB-(105)	%	94	N/A	N/A	N/A	N/A	N/A	N/A	3855382
C13-233'55'-PentaCB-(111)	%	117	N/A	N/A	N/A	N/A	N/A	N/A	3855382
C13-23'44'55'-HexaCB-(167)	%	92	N/A	N/A	N/A	N/A	N/A	N/A	3855382
C13-2344'5-PentaCB-(114)	%	93	N/A	N/A	N/A	N/A	N/A	N/A	3855382
C13-23'44'5-PentaCB-(118)	%	91	N/A	N/A	N/A	N/A	N/A	N/A	3855382
C13-2'344'5-PentaCB-(123)	%	92	N/A	N/A	N/A	N/A	N/A	N/A	3855382
C13-2-MonoCB-(1)	%	31	N/A	N/A	N/A	N/A	N/A	N/A	3855382

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N/A = Not Applicable

Maxxam Job #: B4N0984
Report Date: 2014/12/18

CEM Services Inc
Client Project #: L&RR
Site Location: L&RR
Your P.O. #: 74229

RESULTS OF ANALYSES OF STACK SAMPLING TRAIN

Maxxam ID		YT2089							
Sampling Date		2014/12/02 11:00				TOXIC EQUIVALENCY		# of	
	Units	M23-1	EDL	RDL	MDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
C13-33'44'55'-HexaCB-(169)	%	90	N/A	N/A	N/A	N/A	N/A	N/A	3855382
C13-33'44'5-PentaCB-(126)	%	92	N/A	N/A	N/A	N/A	N/A	N/A	3855382
C13-33'44'-TetraCB-(77)	%	95	N/A	N/A	N/A	N/A	N/A	N/A	3855382
C13-344'5-TetraCB-(81)	%	94	N/A	N/A	N/A	N/A	N/A	N/A	3855382
C13-344'-TriCB-(37)	%	94	N/A	N/A	N/A	N/A	N/A	N/A	3855382
C13-44'-DiCB-(15)	%	73	N/A	N/A	N/A	N/A	N/A	N/A	3855382
C13-4-MonoCB-(3)	%	55	N/A	N/A	N/A	N/A	N/A	N/A	3855382
C13-DecaCB-(209)	%	103	N/A	N/A	N/A	N/A	N/A	N/A	3855382
C13-HexaCB-(156)+(157)	%	89	N/A	N/A	N/A	N/A	N/A	N/A	3855382

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Maxxam Job #: B4N0984
Report Date: 2014/12/18

CEM Services Inc
Client Project #: L&RR
Site Location: L&RR
Your P.O. #: 74229

RESULTS OF ANALYSES OF STACK SAMPLING TRAIN

Maxxam ID		YT2090							
Sampling Date		2014/12/02 15:00				TOXIC EQUIVALENCY		# of	
	Units	M23-2	EDL	RDL	MDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
2-MonoCB-(1)	ng	8.00	0.16	0.30	N/A	N/A	N/A	N/A	3855382
3-MonoCB-(2)	ng	3.23	0.15	0.30	N/A	N/A	N/A	N/A	3855382
4-MonoCB-(3)	ng	2.24	0.16	0.30	N/A	N/A	N/A	N/A	3855382
22'-DiCB-(4)	ng	13.4	0.39	0.30	N/A	N/A	N/A	N/A	3855382
2,3-DiCB-(5)	ng	<0.24 (1)	0.24	0.30	N/A	N/A	N/A	N/A	3855382
2,3'-DiCB-(6)	ng	1.72	0.20	0.30	N/A	N/A	N/A	N/A	3855382
2,4-DiCB-(7)	ng	0.32	0.21	0.30	N/A	N/A	N/A	N/A	3855382
2,4'-DiCB-(8)	ng	8.03	0.19	0.30	N/A	N/A	N/A	N/A	3855382
2,5-DiCB-(9)	ng	1.51	0.20	0.30	N/A	N/A	N/A	N/A	3855382
2,6-DiCB-(10)	ng	<0.34	0.34	0.30	N/A	N/A	N/A	N/A	3855382
3,3'-DiCB-(11)	ng	0.96	0.21	0.30	N/A	N/A	N/A	N/A	3855382
DiCB-(12)+(13)	ng	0.34	0.21	0.60	N/A	N/A	N/A	N/A	3855382
3,5-DiCB-(14)	ng	<0.20	0.20	0.30	N/A	N/A	N/A	N/A	3855382
4,4'-DiCB-(15)	ng	1.17	0.31	0.30	N/A	N/A	N/A	N/A	3855382
22'3-TriCB-(16)	ng	2.15	0.46	0.30	N/A	N/A	N/A	N/A	3855382
22'4-TriCB-(17)	ng	2.50	0.38	0.30	N/A	N/A	N/A	N/A	3855382
TriCB-(18)+(30)	ng	5.56	0.32	0.60	N/A	N/A	N/A	N/A	3855382
22'6-TriCB-(19)	ng	1.46	0.34	0.30	N/A	N/A	N/A	N/A	3855382
TriCB-(20) + (28)	ng	2.53	0.090	0.60	N/A	N/A	N/A	N/A	3855382
TriCB-(21)+(33)	ng	1.62	0.091	0.60	N/A	N/A	N/A	N/A	3855382
234'-TriCB-(22)	ng	0.797	0.098	0.30	N/A	N/A	N/A	N/A	3855382
235-TriCB-(23)	ng	<0.10	0.10	0.30	N/A	N/A	N/A	N/A	3855382
236-TriCB-(24)	ng	<0.30	0.30	0.30	N/A	N/A	N/A	N/A	3855382
23'4-TriCB-(25)	ng	0.226	0.084	0.30	N/A	N/A	N/A	N/A	3855382
TriCB-(26)+(29)	ng	0.589	0.091	0.60	N/A	N/A	N/A	N/A	3855382
23'6-TriCB-(27)	ng	0.31	0.26	0.30	N/A	N/A	N/A	N/A	3855382
24'5-TriCB-(31)	ng	2.49	0.084	0.30	N/A	N/A	N/A	N/A	3855382
24'6-TriCB-(32)	ng	1.20	0.24	0.30	N/A	N/A	N/A	N/A	3855382

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(1) EMPC / NDR - Peak detected does not meet ratio criteria and has resulted in an elevated detection limit.

Maxxam Job #: B4N0984
Report Date: 2014/12/18

CEM Services Inc
Client Project #: L&RR
Site Location: L&RR
Your P.O. #: 74229

RESULTS OF ANALYSES OF STACK SAMPLING TRAIN

Maxxam ID		YT2090							
Sampling Date		2014/12/02 15:00				TOXIC EQUIVALENCY		# of	
	Units	M23-2	EDL	RDL	MDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
23'5'-TriCB-(34)	ng	<0.089	0.089	0.30	N/A	N/A	N/A	N/A	3855382
33'4-TriCB-(35)	ng	<0.089	0.089	0.30	N/A	N/A	N/A	N/A	3855382
33'5-TriCB-(36)	ng	<0.079	0.079	0.30	N/A	N/A	N/A	N/A	3855382
344'-TriCB-(37)	ng	<0.14	0.14	0.30	N/A	N/A	N/A	N/A	3855382
345-TriCB-(38)	ng	<0.093	0.093	0.30	N/A	N/A	N/A	N/A	3855382
34'5-TriCB-(39)	ng	<0.090	0.090	0.30	N/A	N/A	N/A	N/A	3855382
TetraCB-(40)+(41)+(71)	ng	0.30	0.21	0.90	N/A	N/A	N/A	N/A	3855382
22'34'-TetraCB-(42)	ng	<0.25	0.25	0.30	N/A	N/A	N/A	N/A	3855382
22'35-TetraCB-(43)	ng	<0.28	0.28	0.30	N/A	N/A	N/A	N/A	3855382
TetraCB-(44)+(47)+(65)	ng	0.66	0.19	0.90	N/A	N/A	N/A	N/A	3855382
TetraCB-(45)+(51)	ng	0.39	0.21	0.60	N/A	N/A	N/A	N/A	3855382
22'36'-TetraCB-(46)	ng	<0.25	0.25	0.30	N/A	N/A	N/A	N/A	3855382
22'45-TetraCB-(48)	ng	<0.22	0.22	0.30	N/A	N/A	N/A	N/A	3855382
TetraCB-(49)+TetraCB-(69)	ng	0.43	0.18	0.60	N/A	N/A	N/A	N/A	3855382
TetraCB-(50)+(53)	ng	0.31	0.20	0.60	N/A	N/A	N/A	N/A	3855382
22'55'-TetraCB-(52)	ng	0.74	0.18	0.30	N/A	N/A	N/A	N/A	3855382
22'66'-TetraCB-(54)	ng	<0.31	0.31	0.30	N/A	N/A	N/A	N/A	3855382
233'4-TetraCB-(55)	ng	<0.13	0.13	0.30	N/A	N/A	N/A	N/A	3855382
233'4'-Tetra CB(56)	ng	<0.12	0.12	0.30	N/A	N/A	N/A	N/A	3855382
233'5-TetraCB-(57)	ng	<0.11	0.11	0.30	N/A	N/A	N/A	N/A	3855382
233'5'-TetraCB-(58)	ng	<0.12	0.12	0.30	N/A	N/A	N/A	N/A	3855382
TetraCB-(59)+(62)+(75)	ng	<0.15	0.15	0.90	N/A	N/A	N/A	N/A	3855382
2344'-TetraCB -(60)	ng	<0.12	0.12	0.30	N/A	N/A	N/A	N/A	3855382
TetraCB-(61)+(70)+(74)+(76)	ng	0.25	0.11	1.2	N/A	N/A	N/A	N/A	3855382
234'5-TetraCB-(63)	ng	<0.11	0.11	0.30	N/A	N/A	N/A	N/A	3855382
234'6-TetraCB-(64)	ng	0.21	0.17	0.30	N/A	N/A	N/A	N/A	3855382
23'44'-TetraCB-(66)	ng	<0.10	0.10	0.30	N/A	N/A	N/A	N/A	3855382
23'45-TetraCB-(67)	ng	<0.098	0.098	0.30	N/A	N/A	N/A	N/A	3855382
23'45'-TetraCB-(68)	ng	<0.11	0.11	0.30	N/A	N/A	N/A	N/A	3855382

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Maxxam Job #: B4N0984
Report Date: 2014/12/18

CEM Services Inc
Client Project #: L&RR
Site Location: L&RR
Your P.O. #: 74229

RESULTS OF ANALYSES OF STACK SAMPLING TRAIN

Maxxam ID		YT2090							
Sampling Date		2014/12/02 15:00				TOXIC EQUIVALENCY		# of	
	Units	M23-2	EDL	RDL	MDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
23'55'-TetraCB-(72)	ng	<0.11	0.11	0.30	N/A	N/A	N/A	N/A	3855382
23'5'6-TetraCB-(73)	ng	<0.18	0.18	0.30	N/A	N/A	N/A	N/A	3855382
33'44'-TetraCB-(77)	ng	<0.13	0.13	0.30	N/A	0.000100	0.0000130	N/A	3855382
33'45-TetraCB-(78)	ng	<0.11	0.11	0.30	N/A	N/A	N/A	N/A	3855382
33'45'-TetraCB(79)	ng	<0.096	0.096	0.30	N/A	N/A	N/A	N/A	3855382
33'55'-TetraCB-(80)	ng	<0.098	0.098	0.30	N/A	N/A	N/A	N/A	3855382
344'5-TetraCB-(81)	ng	<0.13	0.13	0.30	N/A	0.000300	0.0000390	N/A	3855382
22'33'4-PentaCB-(82)	ng	<0.17	0.17	0.30	N/A	N/A	N/A	N/A	3855382
PentaCB-(83)+(99)	ng	<0.15	0.15	0.60	N/A	N/A	N/A	N/A	3855382
22'33'6-PentaCB-(84)	ng	<0.17	0.17	0.30	N/A	N/A	N/A	N/A	3855382
PentaCB-(85)+(116)+(117)	ng	<0.12	0.12	0.90	N/A	N/A	N/A	N/A	3855382
PentaCB-(86)(87)(97)(109)(119)(125)	ng	<0.13	0.13	1.8	N/A	N/A	N/A	N/A	3855382
PentaCB-(88)+(91)	ng	<0.15	0.15	0.60	N/A	N/A	N/A	N/A	3855382
22'346'-PentaCB-(89)	ng	<0.16	0.16	0.30	N/A	N/A	N/A	N/A	3855382
PentaCB-(90)+(101)+(113)	ng	<0.13	0.13	0.90	N/A	N/A	N/A	N/A	3855382
22'355'-PentaCB-(92)	ng	<0.15	0.15	0.30	N/A	N/A	N/A	N/A	3855382
PentaCB-(93)+(98)+(100)+(102)	ng	<0.15	0.15	1.2	N/A	N/A	N/A	N/A	3855382
22'356'-PentaCB-(94)	ng	<0.17	0.17	0.30	N/A	N/A	N/A	N/A	3855382
22'35'6-PentaCB-(95)	ng	0.15	0.14	0.30	N/A	N/A	N/A	N/A	3855382
22'366'-PentaCB-(96)	ng	<0.14	0.14	0.30	N/A	N/A	N/A	N/A	3855382
22'45'6-PentaCB-(103)	ng	<0.13	0.13	0.30	N/A	N/A	N/A	N/A	3855382
22'466'-PentaCB-(104)	ng	<0.13	0.13	0.30	N/A	N/A	N/A	N/A	3855382
233'44'-PentaCB-(105)	ng	<0.093	0.093	0.30	N/A	0.0000300	0.00000279	N/A	3855382
233'45-PentaCB-(106)	ng	<0.081	0.081	0.30	N/A	N/A	N/A	N/A	3855382
233'4'5-PentaCB-(107)	ng	<0.072	0.072	0.30	N/A	N/A	N/A	N/A	3855382
PentaCB-(108)+(124)	ng	<0.082	0.082	0.60	N/A	N/A	N/A	N/A	3855382
PentaCB-(110)+(115)	ng	<0.12	0.12	0.60	N/A	N/A	N/A	N/A	3855382
233'55'-PentaCB-(111)	ng	<0.11	0.11	0.30	N/A	N/A	N/A	N/A	3855382
233'56-PentaCB-(112)	ng	<0.11	0.11	0.30	N/A	N/A	N/A	N/A	3855382

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The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.

WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds

QC Batch = Quality Control Batch

N/A = Not Applicable

Maxxam Job #: B4N0984
Report Date: 2014/12/18

CEM Services Inc
Client Project #: L&RR
Site Location: L&RR
Your P.O. #: 74229

RESULTS OF ANALYSES OF STACK SAMPLING TRAIN

Maxxam ID		YT2090							
Sampling Date		2014/12/02 15:00				TOXIC EQUIVALENCY		# of	
	Units	M23-2	EDL	RDL	MDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
2344'5-PentaCB-(114)	ng	<0.089	0.089	0.30	N/A	0.0000300	0.00000267	N/A	3855382
23'44'5-PentaCB-(118)	ng	<0.091	0.091	0.30	N/A	0.0000300	0.00000273	N/A	3855382
23'455'-PentaCB-(120)	ng	<0.10	0.10	0.30	N/A	N/A	N/A	N/A	3855382
23'45'6-PentaCB-(121)	ng	<0.12	0.12	0.30	N/A	N/A	N/A	N/A	3855382
233'4'5'-PentaCB-(122)	ng	<0.086	0.086	0.30	N/A	N/A	N/A	N/A	3855382
23'44'5'-PentaCB-(123)	ng	<0.10	0.10	0.30	N/A	0.0000300	0.00000300	N/A	3855382
33'44'5-PentaCB-(126)	ng	<0.091	0.091	0.30	N/A	0.100	0.00910	N/A	3855382
33'455'-PentaCB-(127)	ng	<0.077	0.077	0.30	N/A	N/A	N/A	N/A	3855382
HexaCB-(128)+(166)	ng	<0.20	0.20	0.60	N/A	N/A	N/A	N/A	3855382
HexaCB-(129)+(138)+(163)	ng	<0.22	0.22	0.90	N/A	N/A	N/A	N/A	3855382
22'33'45'-HexaCB-(130)	ng	<0.27	0.27	0.30	N/A	N/A	N/A	N/A	3855382
22'33'46-HexaCB-(131)	ng	<0.28	0.28	0.30	N/A	N/A	N/A	N/A	3855382
22'33'46'-HexaCB-(132)	ng	<0.27	0.27	0.30	N/A	N/A	N/A	N/A	3855382
22'33'55'-HexaCB-(133)	ng	<0.24	0.24	0.30	N/A	N/A	N/A	N/A	3855382
HexaCB-(134)+(143)	ng	<0.27	0.27	0.60	N/A	N/A	N/A	N/A	3855382
HexaCB-(135)+(151)	ng	<0.26	0.26	0.60	N/A	N/A	N/A	N/A	3855382
22'33'66'-HexaCB-(136)	ng	<0.18	0.18	0.30	N/A	N/A	N/A	N/A	3855382
22'344'5-HexaCB-(137)	ng	<0.27	0.27	0.30	N/A	N/A	N/A	N/A	3855382
HexaCB-(139)+(140)	ng	<0.22	0.22	0.60	N/A	N/A	N/A	N/A	3855382
22'3455'-HexaCB-(141)	ng	<0.25	0.25	0.30	N/A	N/A	N/A	N/A	3855382
22'3456-HexaCB-(142)	ng	<0.26	0.26	0.30	N/A	N/A	N/A	N/A	3855382
22'345'6-HexaCB-(144)	ng	<0.25	0.25	0.30	N/A	N/A	N/A	N/A	3855382
22'3466'-HexaCB-(145)	ng	<0.20	0.20	0.30	N/A	N/A	N/A	N/A	3855382
22'34'55'-HexaCB-(146)	ng	<0.21	0.21	0.30	N/A	N/A	N/A	N/A	3855382
HexaCB-(147)+(149)	ng	<0.23	0.23	0.60	N/A	N/A	N/A	N/A	3855382
22'34'56'-HexaCB-(148)	ng	<0.25	0.25	0.30	N/A	N/A	N/A	N/A	3855382
22'34'66'-HexaCB-(150)	ng	<0.18	0.18	0.30	N/A	N/A	N/A	N/A	3855382
22'3566'-HexaCB-(152)	ng	<0.18	0.18	0.30	N/A	N/A	N/A	N/A	3855382
HexaCB-(153)+(168)	ng	<0.18	0.18	0.60	N/A	N/A	N/A	N/A	3855382

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Maxxam Job #: B4N0984
Report Date: 2014/12/18

CEM Services Inc
Client Project #: L&RR
Site Location: L&RR
Your P.O. #: 74229

RESULTS OF ANALYSES OF STACK SAMPLING TRAIN

Maxxam ID		YT2090							
Sampling Date		2014/12/02 15:00				TOXIC EQUIVALENCY		# of	
	Units	M23-2	EDL	RDL	MDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
22'44'56'-HexaCB-(154)	ng	<0.22	0.22	0.30	N/A	N/A	N/A	N/A	3855382
22'44'66'-HexaCB-(155)	ng	<0.17	0.17	0.30	N/A	N/A	N/A	N/A	3855382
HexaCB-(156)+(157)	ng	<0.13	0.13	0.60	N/A	0.0000300	0.00000390	N/A	3855382
233'44'6-HexaCB-(158)	ng	<0.16	0.16	0.30	N/A	N/A	N/A	N/A	3855382
233'455'-HexaCB-(159)	ng	<0.11	0.11	0.30	N/A	N/A	N/A	N/A	3855382
233'456-HexaCB-(160)	ng	<0.19	0.19	0.30	N/A	N/A	N/A	N/A	3855382
233'45'6-HexaCB-(161)	ng	<0.17	0.17	0.30	N/A	N/A	N/A	N/A	3855382
233'4'55'-HexaCB-(162)	ng	<0.12	0.12	0.30	N/A	N/A	N/A	N/A	3855382
233'4'5'6-HexaCB-(164)	ng	<0.16	0.16	0.30	N/A	N/A	N/A	N/A	3855382
233'55'6-HexaCB-(165)	ng	<0.20	0.20	0.30	N/A	N/A	N/A	N/A	3855382
23'44'55'-HexaCB-(167)	ng	<0.14	0.14	0.30	N/A	0.0000300	0.00000420	N/A	3855382
33'44'55'-HexaCB-(169)	ng	<0.14	0.14	0.30	N/A	0.0300	0.00420	N/A	3855382
22'33'44'5-HeptaCB-(170)	ng	<0.21	0.21	0.30	N/A	N/A	N/A	N/A	3855382
HeptaCB-(171)+(173)	ng	<0.31	0.31	0.60	N/A	N/A	N/A	N/A	3855382
22'33'455'-HeptaCB-(172)	ng	<0.32	0.32	0.30	N/A	N/A	N/A	N/A	3855382
22'33'456'-HeptaCB-(174)	ng	<0.29	0.29	0.30	N/A	N/A	N/A	N/A	3855382
22'33'45'6-HeptaCB-(175)	ng	<0.24	0.24	0.30	N/A	N/A	N/A	N/A	3855382
22'33'466'-HeptaCB-(176)	ng	<0.18	0.18	0.30	N/A	N/A	N/A	N/A	3855382
22'33'45'6'-HeptaCB-(177)	ng	<0.31	0.31	0.30	N/A	N/A	N/A	N/A	3855382
22'33'55'6-HeptaCB-(178)	ng	<0.25	0.25	0.30	N/A	N/A	N/A	N/A	3855382
22'33'566'-HeptaCB-(179)	ng	<0.17	0.17	0.30	N/A	N/A	N/A	N/A	3855382
HeptaCB-(180)+(193)	ng	<0.19	0.19	0.60	N/A	N/A	N/A	N/A	3855382
22'344'56-HeptaCB-(181)	ng	<0.31	0.31	0.30	N/A	N/A	N/A	N/A	3855382
22'344'56'-HeptaCB-(182)	ng	<0.23	0.23	0.30	N/A	N/A	N/A	N/A	3855382
22'344'5'6-HeptaCB-(183)	ng	<0.27	0.27	0.30	N/A	N/A	N/A	N/A	3855382
22'344'66'-HeptaCB-(184)	ng	<0.18	0.18	0.30	N/A	N/A	N/A	N/A	3855382
22'3455'6-HeptaCB-(185)	ng	<0.32	0.32	0.30	N/A	N/A	N/A	N/A	3855382
22'34566'-HeptaCB-(186)	ng	<0.19	0.19	0.30	N/A	N/A	N/A	N/A	3855382
22'34'55'6-HeptaCB-(187)	ng	<0.24	0.24	0.30	N/A	N/A	N/A	N/A	3855382

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Maxxam Job #: B4N0984
Report Date: 2014/12/18

CEM Services Inc
Client Project #: L&RR
Site Location: L&RR
Your P.O. #: 74229

RESULTS OF ANALYSES OF STACK SAMPLING TRAIN

Maxxam ID		YT2090							
Sampling Date		2014/12/02 15:00				TOXIC EQUIVALENCY		# of	
	Units	M23-2	EDL	RDL	MDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
22'34'566'-HeptaCB-(188)	ng	<0.19	0.19	0.30	N/A	N/A	N/A	N/A	3855382
233'44'55'-HeptaCB-(189)	ng	<0.15	0.15	0.30	N/A	0.0000300	0.00000450	N/A	3855382
233'44'56-HeptaCB-(190)	ng	<0.23	0.23	0.30	N/A	N/A	N/A	N/A	3855382
233'44'5'6-HeptaCB-(191)	ng	<0.22	0.22	0.30	N/A	N/A	N/A	N/A	3855382
233'455'6-HeptaCB-(192)	ng	<0.26	0.26	0.30	N/A	N/A	N/A	N/A	3855382
22'33'44'55'-OctaCB-(194)	ng	<0.22	0.22	0.30	N/A	N/A	N/A	N/A	3855382
22'33'44'56-OctaCB-(195)	ng	<0.24	0.24	0.30	N/A	N/A	N/A	N/A	3855382
22'33'44'56'-OctaCB-(196)	ng	<0.28	0.28	0.30	N/A	N/A	N/A	N/A	3855382
22'33'44'66'OctaCB-(197)	ng	<0.23	0.23	0.30	N/A	N/A	N/A	N/A	3855382
OctaCB-(198)+(199)	ng	<0.29	0.29	0.60	N/A	N/A	N/A	N/A	3855382
22'33'4566'-OctaCB-(200)	ng	<0.19	0.19	0.30	N/A	N/A	N/A	N/A	3855382
22'33'45'66'-OctaCB-(201)	ng	<0.20	0.20	0.30	N/A	N/A	N/A	N/A	3855382
22'33'55'66'-OctaCB-(202)	ng	<0.23	0.23	0.30	N/A	N/A	N/A	N/A	3855382
22'344'55'6-OctaCB-(203)	ng	<0.27	0.27	0.30	N/A	N/A	N/A	N/A	3855382
22'344'566'-OctaCB-(204)	ng	<0.20	0.20	0.30	N/A	N/A	N/A	N/A	3855382
233'44'55'6-OctaCB-(205)	ng	<0.19	0.19	0.30	N/A	N/A	N/A	N/A	3855382
22'33'44'55'6-NonaCB-(206)	ng	<0.39	0.39	0.30	N/A	N/A	N/A	N/A	3855382
22'33'44'566'-NonaCB-(207)	ng	<0.30	0.30	0.30	N/A	N/A	N/A	N/A	3855382
22'33'455'66'-NonaCB-(208)	ng	<0.36	0.36	0.30	N/A	N/A	N/A	N/A	3855382
DecaCB-(209)	ng	<0.49	0.49	0.30	N/A	N/A	N/A	N/A	3855382
Monochlorobiphenyl	ng	13.5	0.16	N/A	N/A	N/A	N/A	3	3855382
Dichlorobiphenyl	ng	27.5	0.39	N/A	N/A	N/A	N/A	8	3855382
Trichlorobiphenyl	ng	21.4	0.46	N/A	N/A	N/A	N/A	12	3855382
Tetrachlorobiphenyl	ng	3.29	0.31	N/A	N/A	N/A	N/A	8	3855382
Pentachlorobiphenyl	ng	<0.17	0.17	N/A	N/A	N/A	N/A	1	3855382
Hexachlorobiphenyl	ng	<0.28	0.28	N/A	N/A	N/A	N/A	N/A	3855382
Heptachlorobiphenyl	ng	<0.32	0.32	N/A	N/A	N/A	N/A	N/A	3855382
Octachlorobiphenyl	ng	<0.29	0.29	N/A	N/A	N/A	N/A	N/A	3855382
Nonachlorobiphenyl	ng	<0.39	0.39	N/A	N/A	N/A	N/A	N/A	3855382

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Maxxam Job #: B4N0984
Report Date: 2014/12/18

CEM Services Inc
Client Project #: L&RR
Site Location: L&RR
Your P.O. #: 74229

RESULTS OF ANALYSES OF STACK SAMPLING TRAIN

Maxxam ID		YT2090							
Sampling Date		2014/12/02 15:00				TOXIC EQUIVALENCY		# of	
	Units	M23-2	EDL	RDL	MDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
Decachlorobiphenyl	ng	<0.49	0.49	N/A	N/A	N/A	N/A	N/A	3855382
TOTAL TOXIC EQUIVALENCY	ng	N/A	N/A	N/A	N/A	N/A	0.0134	N/A	N/A
Surrogate Recovery (%)									
C13-2,2',3,5',6-PentaCB(95) (FS)	%	86	N/A	N/A	N/A	N/A	N/A	N/A	3855382
C13-2,44'-TriCB-(28)	%	89	N/A	N/A	N/A	N/A	N/A	N/A	3855382
C13-2,4'5-TriCB-(31) (FS)	%	74	N/A	N/A	N/A	N/A	N/A	N/A	3855382
C13-22'33'44'55'6-NonaCB-(206)	%	110	N/A	N/A	N/A	N/A	N/A	N/A	3855382
C13-22'33'44'5-HeptaCB-(170)	%	103	N/A	N/A	N/A	N/A	N/A	N/A	3855382
C13-22'33'455'66'-NonaCB-(208)	%	108	N/A	N/A	N/A	N/A	N/A	N/A	3855382
C13-22'33'55'66'-OctaCB-(202)	%	117	N/A	N/A	N/A	N/A	N/A	N/A	3855382
C13-22'33'55'6-HeptaCB-(178)	%	112	N/A	N/A	N/A	N/A	N/A	N/A	3855382
C13-22'344'55'-HeptaCB-(180)	%	102	N/A	N/A	N/A	N/A	N/A	N/A	3855382
C13-22'34'566'-HeptaCB-(188)	%	100	N/A	N/A	N/A	N/A	N/A	N/A	3855382
C13-22'44'55'HexaCB-(153) (FS)	%	89	N/A	N/A	N/A	N/A	N/A	N/A	3855382
C13-22'44'66'-HexaCB-(155)	%	89	N/A	N/A	N/A	N/A	N/A	N/A	3855382
C13-22'466'-PentaCB-(104)	%	88	N/A	N/A	N/A	N/A	N/A	N/A	3855382
C13-22'66'-TetraCB-(54)	%	56	N/A	N/A	N/A	N/A	N/A	N/A	3855382
C13-22'6-TriCB-(19)	%	56	N/A	N/A	N/A	N/A	N/A	N/A	3855382
C13-22'-DiCB-(4)	%	46	N/A	N/A	N/A	N/A	N/A	N/A	3855382
C13-233'44'55'6-OctaCB-(205)	%	120	N/A	N/A	N/A	N/A	N/A	N/A	3855382
C13-233'44'55'-HeptaCB-(189)	%	112	N/A	N/A	N/A	N/A	N/A	N/A	3855382
C13-233'44'-PentaCB-(105)	%	97	N/A	N/A	N/A	N/A	N/A	N/A	3855382
C13-233'55'-PentaCB-(111)	%	111	N/A	N/A	N/A	N/A	N/A	N/A	3855382
C13-23'44'55'-HexaCB-(167)	%	98	N/A	N/A	N/A	N/A	N/A	N/A	3855382
C13-2344'5-PentaCB-(114)	%	98	N/A	N/A	N/A	N/A	N/A	N/A	3855382
C13-23'44'5-PentaCB-(118)	%	96	N/A	N/A	N/A	N/A	N/A	N/A	3855382
C13-2'344'5-PentaCB-(123)	%	96	N/A	N/A	N/A	N/A	N/A	N/A	3855382
C13-2-MonoCB-(1)	%	38	N/A	N/A	N/A	N/A	N/A	N/A	3855382
C13-33'44'55'-HexaCB-(169)	%	96	N/A	N/A	N/A	N/A	N/A	N/A	3855382

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Maxxam Job #: B4N0984
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CEM Services Inc
Client Project #: L&RR
Site Location: L&RR
Your P.O. #: 74229

RESULTS OF ANALYSES OF STACK SAMPLING TRAIN

Maxxam ID		YT2090							
Sampling Date		2014/12/02 15:00				TOXIC EQUIVALENCY		# of	
	Units	M23-2	EDL	RDL	MDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
C13-33'44'5-PentaCB-(126)	%	101	N/A	N/A	N/A	N/A	N/A	N/A	3855382
C13-33'44'-TetraCB-(77)	%	98	N/A	N/A	N/A	N/A	N/A	N/A	3855382
C13-344'5-TetraCB-(81)	%	98	N/A	N/A	N/A	N/A	N/A	N/A	3855382
C13-344'-TriCB-(37)	%	96	N/A	N/A	N/A	N/A	N/A	N/A	3855382
C13-44'-DiCB-(15)	%	72	N/A	N/A	N/A	N/A	N/A	N/A	3855382
C13-4-MonoCB-(3)	%	54	N/A	N/A	N/A	N/A	N/A	N/A	3855382
C13-DecaCB-(209)	%	98	N/A	N/A	N/A	N/A	N/A	N/A	3855382
C13-HexaCB-(156)+(157)	%	97	N/A	N/A	N/A	N/A	N/A	N/A	3855382

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CEM Services Inc
Client Project #: L&RR
Site Location: L&RR
Your P.O. #: 74229

RESULTS OF ANALYSES OF STACK SAMPLING TRAIN

Maxxam ID		YT2091							
Sampling Date		2014/12/03 09:00				TOXIC EQUIVALENCY		# of	
	Units	M23-3	EDL	RDL	MDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
2-MonoCB-(1)	ng	159	0.18	0.30	N/A	N/A	N/A	N/A	3855382
3-MonoCB-(2)	ng	351	0.17	0.30	N/A	N/A	N/A	N/A	3855382
4-MonoCB-(3)	ng	218	0.17	0.30	N/A	N/A	N/A	N/A	3855382
22'-DiCB-(4)	ng	16.8	0.41	0.30	N/A	N/A	N/A	N/A	3855382
2,3-DiCB-(5)	ng	2.58	0.18	0.30	N/A	N/A	N/A	N/A	3855382
2,3'-DiCB-(6)	ng	4.61	0.16	0.30	N/A	N/A	N/A	N/A	3855382
2,4-DiCB-(7)	ng	3.03	0.17	0.30	N/A	N/A	N/A	N/A	3855382
2,4'-DiCB-(8)	ng	12.7	0.15	0.30	N/A	N/A	N/A	N/A	3855382
2,5-DiCB-(9)	ng	3.68	0.16	0.30	N/A	N/A	N/A	N/A	3855382
2,6-DiCB-(10)	ng	0.52	0.35	0.30	N/A	N/A	N/A	N/A	3855382
3,3'-DiCB-(11)	ng	8.15	0.16	0.30	N/A	N/A	N/A	N/A	3855382
DiCB-(12)+(13)	ng	35.9	0.17	0.60	N/A	N/A	N/A	N/A	3855382
3,5-DiCB-(14)	ng	4.42	0.16	0.30	N/A	N/A	N/A	N/A	3855382
4,4'-DiCB-(15)	ng	4.29	0.25	0.30	N/A	N/A	N/A	N/A	3855382
22'3-TriCB-(16)	ng	3.00	0.43	0.30	N/A	N/A	N/A	N/A	3855382
22'4-TriCB-(17)	ng	3.83	0.35	0.30	N/A	N/A	N/A	N/A	3855382
TriCB-(18)+(30)	ng	8.26	0.29	0.60	N/A	N/A	N/A	N/A	3855382
22'6-TriCB-(19)	ng	1.92	0.31	0.30	N/A	N/A	N/A	N/A	3855382
TriCB-(20) + (28)	ng	4.17	0.084	0.60	N/A	N/A	N/A	N/A	3855382
TriCB-(21)+(33)	ng	3.25	0.085	0.60	N/A	N/A	N/A	N/A	3855382
234'-TriCB-(22)	ng	1.33	0.092	0.30	N/A	N/A	N/A	N/A	3855382
235-TriCB-(23)	ng	0.241	0.096	0.30	N/A	N/A	N/A	N/A	3855382
236-TriCB-(24)	ng	<0.28	0.28	0.30	N/A	N/A	N/A	N/A	3855382
23'4-TriCB-(25)	ng	0.487	0.078	0.30	N/A	N/A	N/A	N/A	3855382
TriCB-(26)+(29)	ng	1.31	0.085	0.60	N/A	N/A	N/A	N/A	3855382
23'6-TriCB-(27)	ng	0.46	0.24	0.30	N/A	N/A	N/A	N/A	3855382
24'5-TriCB-(31)	ng	3.85	0.078	0.30	N/A	N/A	N/A	N/A	3855382
24'6-TriCB-(32)	ng	1.69	0.23	0.30	N/A	N/A	N/A	N/A	3855382
23'5'-TriCB-(34)	ng	0.092	0.083	0.30	N/A	N/A	N/A	N/A	3855382

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Maxxam Job #: B4N0984
Report Date: 2014/12/18

CEM Services Inc
Client Project #: L&RR
Site Location: L&RR
Your P.O. #: 74229

RESULTS OF ANALYSES OF STACK SAMPLING TRAIN

Maxxam ID		YT2091							
Sampling Date		2014/12/03 09:00				TOXIC EQUIVALENCY		# of	
	Units	M23-3	EDL	RDL	MDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
33'4-TriCB-(35)	ng	1.26	0.083	0.30	N/A	N/A	N/A	N/A	3855382
33'5-TriCB-(36)	ng	0.259	0.074	0.30	N/A	N/A	N/A	N/A	3855382
344'-TriCB-(37)	ng	1.13	0.13	0.30	N/A	N/A	N/A	N/A	3855382
345-TriCB-(38)	ng	1.26	0.087	0.30	N/A	N/A	N/A	N/A	3855382
34'5-TriCB-(39)	ng	0.211	0.084	0.30	N/A	N/A	N/A	N/A	3855382
TetraCB-(40)+(41)+(71)	ng	0.51	0.36	0.90	N/A	N/A	N/A	N/A	3855382
22'34'-TetraCB-(42)	ng	<0.43	0.43	0.30	N/A	N/A	N/A	N/A	3855382
22'35-TetraCB-(43)	ng	<0.49	0.49	0.30	N/A	N/A	N/A	N/A	3855382
TetraCB-(44)+(47)+(65)	ng	1.28	0.33	0.90	N/A	N/A	N/A	N/A	3855382
TetraCB-(45)+(51)	ng	0.66	0.37	0.60	N/A	N/A	N/A	N/A	3855382
22'36'-TetraCB-(46)	ng	<0.43	0.43	0.30	N/A	N/A	N/A	N/A	3855382
22'45-TetraCB-(48)	ng	<0.37	0.37	0.30	N/A	N/A	N/A	N/A	3855382
TetraCB-(49)+TetraCB-(69)	ng	0.70	0.31	0.60	N/A	N/A	N/A	N/A	3855382
TetraCB-(50)+(53)	ng	0.46	0.35	0.60	N/A	N/A	N/A	N/A	3855382
22'55'-TetraCB-(52)	ng	1.28	0.30	0.30	N/A	N/A	N/A	N/A	3855382
22'66'-TetraCB-(54)	ng	<0.32	0.32	0.30	N/A	N/A	N/A	N/A	3855382
233'4-TetraCB-(55)	ng	<0.14	0.14	0.30	N/A	N/A	N/A	N/A	3855382
233'4'-Tetra CB(56)	ng	0.18	0.13	0.30	N/A	N/A	N/A	N/A	3855382
233'5-TetraCB-(57)	ng	<0.12	0.12	0.30	N/A	N/A	N/A	N/A	3855382
233'5'-TetraCB-(58)	ng	<0.13	0.13	0.30	N/A	N/A	N/A	N/A	3855382
TetraCB-(59)+(62)+(75)	ng	<0.26	0.26	0.90	N/A	N/A	N/A	N/A	3855382
2344'-TetraCB -(60)	ng	<0.13	0.13	0.30	N/A	N/A	N/A	N/A	3855382
TetraCB-(61)+(70)+(74)+(76)	ng	0.66	0.12	1.2	N/A	N/A	N/A	N/A	3855382
234'5-TetraCB-(63)	ng	<0.11	0.11	0.30	N/A	N/A	N/A	N/A	3855382
234'6-TetraCB-(64)	ng	0.35	0.28	0.30	N/A	N/A	N/A	N/A	3855382
23'44'-TetraCB-(66)	ng	0.21	0.11	0.30	N/A	N/A	N/A	N/A	3855382
23'45-TetraCB-(67)	ng	<0.10	0.10	0.30	N/A	N/A	N/A	N/A	3855382
23'45'-TetraCB-(68)	ng	<0.12	0.12	0.30	N/A	N/A	N/A	N/A	3855382
23'55'-TetraCB-(72)	ng	<0.12	0.12	0.30	N/A	N/A	N/A	N/A	3855382

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	Units	M23-3	EDL	RDL	MDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
23'5'6-TetraCB-(73)	ng	<0.30	0.30	0.30	N/A	N/A	N/A	N/A	3855382
33'44'-TetraCB-(77)	ng	0.25	0.14	0.30	N/A	0.000100	0.0000250	N/A	3855382
33'45-TetraCB-(78)	ng	<0.12	0.12	0.30	N/A	N/A	N/A	N/A	3855382
33'45'-TetraCB(79)	ng	<0.10	0.10	0.30	N/A	N/A	N/A	N/A	3855382
33'55'-TetraCB-(80)	ng	<0.11	0.11	0.30	N/A	N/A	N/A	N/A	385S382
344'5-TetraCB-(81)	ng	<0.14	0.14	0.30	N/A	0.000300	0.0000420	N/A	3855382
22'33'4-PentaCB-(82)	ng	<0.18	0.18	0.30	N/A	N/A	N/A	N/A	3855382
PentaCB-(83)+(99)	ng	<0.16	0.16	0.60	N/A	N/A	N/A	N/A	3855382
22'33'6-PentaCB-(84)	ng	<0.18	0.18	0.30	N/A	N/A	N/A	N/A	3855382
PentaCB-(85)+(116)+(117)	ng	<0.13	0.13	0.90	N/A	N/A	N/A	N/A	3855382
PentaCB-(86)(87)(97)(109)(119)(125)	ng	0.19	0.13	1.8	N/A	N/A	N/A	N/A	3855382
PentaCB-(88)+(91)	ng	<0.16	0.16	0.60	N/A	N/A	N/A	N/A	3855382
22'346'-PentaCB-(89)	ng	<0.17	0.17	0.30	N/A	N/A	N/A	N/A	3855382
PentaCB-(90)+(101)+(113)	ng	0.25	0.13	0.90	N/A	N/A	N/A	N/A	3855382
22'355'-PentaCB-(92)	ng	<0.16	0.16	0.30	N/A	N/A	N/A	N/A	3855382
PentaCB-(93)+(98)+(100)+(102)	ng	<0.16	0.16	1.2	N/A	N/A	N/A	N/A	3855382
22'356'-PentaCB-(94)	ng	<0.18	0.18	0.30	N/A	N/A	N/A	N/A	3855382
22'35'6-PentaCB-(95)	ng	0.29	0.14	0.30	N/A	N/A	N/A	N/A	3855382
22'366'-PentaCB-(96)	ng	<0.17	0.17	0.30	N/A	N/A	N/A	N/A	3855382
22'45'6-PentaCB-(103)	ng	<0.13	0.13	0.30	N/A	N/A	N/A	N/A	3855382
22'466'-PentaCB-(104)	ng	<0.15	0.15	0.30	N/A	N/A	N/A	N/A	3855382
233'44'-PentaCB-(105)	ng	<0.095	0.095	0.30	N/A	0.0000300	0.00000285	N/A	3855382
233'45-PentaCB-(106)	ng	<0.083	0.083	0.30	N/A	N/A	N/A	N/A	3855382
233'4'5-PentaCB-(107)	ng	<0.074	0.074	0.30	N/A	N/A	N/A	N/A	3855382
PentaCB-(108)+(124)	ng	<0.084	0.084	0.60	N/A	N/A	N/A	N/A	3855382
PentaCB-(110)+(115)	ng	0.23	0.12	0.60	N/A	N/A	N/A	N/A	3855382
233'55'-PentaCB-(111)	ng	<0.12	0.12	0.30	N/A	N/A	N/A	N/A	3855382
233'56-PentaCB-(112)	ng	<0.12	0.12	0.30	N/A	N/A	N/A	N/A	3855382
2344'5-PentaCB-(114)	ng	<0.091	0.091	0.30	N/A	0.0000300	0.00000273	N/A	3855382

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	Units	M23-3	EDL	RDL	MDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
23'44'5-PentaCB-(118)	ng	0.140	0.094	0.30	N/A	0.0000300	0.00000420	N/A	3855382
23'455'-PentaCB-(120)	ng	<0.11	0.11	0.30	N/A	N/A	N/A	N/A	3855382
23'45'6-PentaCB-(121)	ng	<0.12	0.12	0.30	N/A	N/A	N/A	N/A	3855382
233'4'5'-PentaCB-(122)	ng	<0.088	0.088	0.30	N/A	N/A	N/A	N/A	3855382
23'44'5'-PentaCB-(123)	ng	<0.10	0.10	0.30	N/A	0.0000300	0.00000300	N/A	3855382
33'44'5-PentaCB-(126)	ng	<0.093	0.093	0.30	N/A	0.100	0.00930	N/A	3855382
33'455'-PentaCB-(127)	ng	<0.078	0.078	0.30	N/A	N/A	N/A	N/A	3855382
HexaCB-(128)+(166)	ng	<0.17	0.17	0.60	N/A	N/A	N/A	N/A	3855382
HexaCB-(129)+(138)+(163)	ng	<0.18	0.18	0.90	N/A	N/A	N/A	N/A	3855382
22'33'45'-HexaCB-(130)	ng	<0.22	0.22	0.30	N/A	N/A	N/A	N/A	3855382
22'33'46-HexaCB-(131)	ng	<0.24	0.24	0.30	N/A	N/A	N/A	N/A	3855382
22'33'46'-HexaCB-(132)	ng	<0.23	0.23	0.30	N/A	N/A	N/A	N/A	3855382
22'33'55'-HexaCB-(133)	ng	<0.20	0.20	0.30	N/A	N/A	N/A	N/A	3855382
HexaCB-(134)+(143)	ng	<0.22	0.22	0.60	N/A	N/A	N/A	N/A	3855382
HexaCB-(135)+(151)	ng	<0.22	0.22	0.60	N/A	N/A	N/A	N/A	3855382
22'33'66'-HexaCB-(136)	ng	<0.16	0.16	0.30	N/A	N/A	N/A	N/A	3855382
22'344'5-HexaCB-(137)	ng	<0.23	0.23	0.30	N/A	N/A	N/A	N/A	3855382
HexaCB-(139)+(140)	ng	<0.19	0.19	0.60	N/A	N/A	N/A	N/A	3855382
22'3455'-HexaCB-(141)	ng	<0.21	0.21	0.30	N/A	N/A	N/A	N/A	3855382
22'3456-HexaCB-(142)	ng	<0.22	0.22	0.30	N/A	N/A	N/A	N/A	3855382
22'345'6-HexaCB-(144)	ng	<0.21	0.21	0.30	N/A	N/A	N/A	N/A	3855382
22'3466'-HexaCB-(145)	ng	<0.17	0.17	0.30	N/A	N/A	N/A	N/A	3855382
22'34'55'-HexaCB-(146)	ng	<0.18	0.18	0.30	N/A	N/A	N/A	N/A	3855382
HexaCB-(147)+(149)	ng	<0.19	0.19	0.60	N/A	N/A	N/A	N/A	3855382
22'34'56'-HexaCB-(148)	ng	<0.21	0.21	0.30	N/A	N/A	N/A	N/A	3855382
22'34'66'-HexaCB-(150)	ng	<0.16	0.16	0.30	N/A	N/A	N/A	N/A	3855382
22'3566'-HexaCB-(152)	ng	<0.16	0.16	0.30	N/A	N/A	N/A	N/A	3855382
HexaCB-(153)+(168)	ng	<0.15	0.15	0.60	N/A	N/A	N/A	N/A	3855382
22'44'56'-HexaCB-(154)	ng	<0.18	0.18	0.30	N/A	N/A	N/A	N/A	3855382

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	Units	M23-3	EDL	RDL	MDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
22'44'66'-HexaCB-(155)	ng	<0.15	0.15	0.30	N/A	N/A	N/A	N/A	3855382
HexaCB-(156)+(157)	ng	<0.11	0.11	0.60	N/A	0.0000300	0.00000330	N/A	3855382
233'44'6-HexaCB-(158)	ng	<0.13	0.13	0.30	N/A	N/A	N/A	N/A	3855382
233'455'-HexaCB-(159)	ng	<0.097	0.097	0.30	N/A	N/A	N/A	N/A	3855382
233'456-HexaCB-(160)	ng	<0.16	0.16	0.30	N/A	N/A	N/A	N/A	3855382
233'45'6-HexaCB-(161)	ng	<0.14	0.14	0.30	N/A	N/A	N/A	N/A	3855382
233'4'55'-HexaCB-(162)	ng	<0.10	0.10	0.30	N/A	N/A	N/A	N/A	3855382
233'4'5'6-HexaCB-(164)	ng	<0.13	0.13	0.30	N/A	N/A	N/A	N/A	3855382
233'55'6-HexaCB-(165)	ng	<0.17	0.17	0.30	N/A	N/A	N/A	N/A	3855382
23'44'55'-HexaCB-(167)	ng	<0.12	0.12	0.30	N/A	0.0000300	0.00000360	N/A	3855382
33'44'55'-HexaCB-(169)	ng	<0.12	0.12	0.30	N/A	0.0300	0.00360	N/A	3855382
22'33'44'5-HeptaCB-(170)	ng	<0.15	0.15	0.30	N/A	N/A	N/A	N/A	3855382
HeptaCB-(171)+(173)	ng	<0.23	0.23	0.60	N/A	N/A	N/A	N/A	3855382
22'33'455'-HeptaCB-(172)	ng	<0.23	0.23	0.30	N/A	N/A	N/A	N/A	3855382
22'33'456'-HeptaCB-(174)	ng	<0.21	0.21	0.30	N/A	N/A	N/A	N/A	3855382
22'33'45'6-HeptaCB-(175)	ng	<0.21	0.21	0.30	N/A	N/A	N/A	N/A	3855382
22'33'466'-HeptaCB-(176)	ng	<0.15	0.15	0.30	N/A	N/A	N/A	N/A	3855382
22'33'45'6'-HeptaCB-(177)	ng	<0.23	0.23	0.30	N/A	N/A	N/A	N/A	3855382
22'33'55'6-HeptaCB-(178)	ng	<0.22	0.22	0.30	N/A	N/A	N/A	N/A	3855382
22'33'566'-HeptaCB-(179)	ng	<0.15	0.15	0.30	N/A	N/A	N/A	N/A	3855382
HeptaCB-(180)+(193)	ng	<0.14	0.14	0.60	N/A	N/A	N/A	N/A	3855382
22'344'56-HeptaCB-(181)	ng	<0.23	0.23	0.30	N/A	N/A	N/A	N/A	3855382
22'344'56'-HeptaCB-(182)	ng	<0.20	0.20	0.30	N/A	N/A	N/A	N/A	3855382
22'344'5'6-HeptaCB-(183)	ng	<0.20	0.20	0.30	N/A	N/A	N/A	N/A	3855382
22'344'66'-HeptaCB-(184)	ng	<0.16	0.16	0.30	N/A	N/A	N/A	N/A	3855382
22'3455'6-HeptaCB-(185)	ng	<0.23	0.23	0.30	N/A	N/A	N/A	N/A	3855382
22'34566'-HeptaCB-(186)	ng	<0.17	0.17	0.30	N/A	N/A	N/A	N/A	3855382
22'34'55'6-HeptaCB-(187)	ng	<0.21	0.21	0.30	N/A	N/A	N/A	N/A	3855382
22'34'566'-HeptaCB-(188)	ng	<0.17	0.17	0.30	N/A	N/A	N/A	N/A	3855382

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Report Date: 2014/12/18

CEM Services Inc
Client Project #: L&RR
Site Location: L&RR
Your P.O. #: 74229

RESULTS OF ANALYSES OF STACK SAMPLING TRAIN

Maxxam ID		YT2091							
Sampling Date		2014/12/03 09:00				TOXIC EQUIVALENCY		# of	
	Units	M23-3	EDL	RDL	MDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
233'44'55'-HeptaCB-(189)	ng	<0.16	0.16	0.30	N/A	0.0000300	0.00000480	N/A	3855382
233'44'56-HeptaCB-(190)	ng	<0.17	0.17	0.30	N/A	N/A	N/A	N/A	3855382
233'44'5'6-HeptaCB-(191)	ng	<0.16	0.16	0.30	N/A	N/A	N/A	N/A	3855382
233'455'6-HeptaCB-(192)	ng	<0.19	0.19	0.30	N/A	N/A	N/A	N/A	3855382
22'33'44'55'-OctaCB-(194)	ng	<0.26	0.26	0.30	N/A	N/A	N/A	N/A	3855382
22'33'44'56-OctaCB-(195)	ng	<0.29	0.29	0.30	N/A	N/A	N/A	N/A	3855382
22'33'44'56'-OctaCB-(196)	ng	<0.36	0.36	0.30	N/A	N/A	N/A	N/A	3855382
22'33'44'66'OctaCB-(197)	ng	<0.29	0.29	0.30	N/A	N/A	N/A	N/A	3855382
OctaCB-(198)+(199)	ng	<0.37	0.37	0.60	N/A	N/A	N/A	N/A	3855382
22'33'4566'-OctaCB-(200)	ng	<0.24	0.24	0.30	N/A	N/A	N/A	N/A	3855382
22'33'45'66'-OctaCB-(201)	ng	<0.25	0.25	0.30	N/A	N/A	N/A	N/A	3855382
22'33'55'66'-OctaCB-(202)	ng	<0.30	0.30	0.30	N/A	N/A	N/A	N/A	3855382
22'344'55'6-OctaCB-(203)	ng	<0.35	0.35	0.30	N/A	N/A	N/A	N/A	3855382
22'344'566'-OctaCB-(204)	ng	<0.26	0.26	0.30	N/A	N/A	N/A	N/A	3855382
233'44'55'6-OctaCB-(205)	ng	<0.23	0.23	0.30	N/A	N/A	N/A	N/A	3855382
22'33'44'55'6-NonaCB-(206)	ng	<0.42	0.42	0.30	N/A	N/A	N/A	N/A	3855382
22'33'44'566'-NonaCB-(207)	ng	<0.32	0.32	0.30	N/A	N/A	N/A	N/A	3855382
22'33'455'66'-NonaCB-(208)	ng	<0.38	0.38	0.30	N/A	N/A	N/A	N/A	3855382
DecaCB-(209)	ng	<0.45	0.45	0.30	N/A	N/A	N/A	N/A	3855382
Monochlorobiphenyl	ng	729	0.18	N/A	N/A	N/A	N/A	3	3855382
Dichlorobiphenyl	ng	96.6	0.41	N/A	N/A	N/A	N/A	11	3855382
Trichlorobiphenyl	ng	38.0	0.43	N/A	N/A	N/A	N/A	19	3855382
Tetrachlorobiphenyl	ng	6.53	0.49	N/A	N/A	N/A	N/A	11	3855382
Pentachlorobiphenyl	ng	1.10	0.18	N/A	N/A	N/A	N/A	5	3855382
Hexachlorobiphenyl	ng	<0.24	0.24	N/A	N/A	N/A	N/A	N/A	3855382
Heptachlorobiphenyl	ng	<0.23	0.23	N/A	N/A	N/A	N/A	N/A	3855382
Octachlorobiphenyl	ng	<0.37	0.37	N/A	N/A	N/A	N/A	N/A	3855382
Nonachlorobiphenyl	ng	<0.42	0.42	N/A	N/A	N/A	N/A	N/A	3855382
Decachlorobiphenyl	ng	<0.45	0.45	N/A	N/A	N/A	N/A	N/A	3855382

EDL = Estimated Detection Limit
RDL = Reportable Detection Limit
TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,
The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.

WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds

QC Batch = Quality Control Batch
N/A = Not Applicable

Maxxam Job #: B4N0984
Report Date: 2014/12/18

CEM Services Inc
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RESULTS OF ANALYSES OF STACK SAMPLING TRAIN

Maxxam ID		YT2091							
Sampling Date		2014/12/03 09:00				TOXIC EQUIVALENCY		# of	
	Units	M23-3	EDL	RDL	MDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
TOTAL TOXIC EQUIVALENCY	ng	N/A	N/A	N/A	N/A	N/A	0.0130	N/A	N/A
Surrogate Recovery (%)									
C13-2,2',3,5',6-PentaCB(95) (FS)	%	81	N/A	N/A	N/A	N/A	N/A	N/A	3855382
C13-2,44'-TriCB-(28)	%	95	N/A	N/A	N/A	N/A	N/A	N/A	3855382
C13-2,4'5-TriCB-(31) (FS)	%	76	N/A	N/A	N/A	N/A	N/A	N/A	3855382
C13-22'33'44'55'6-NonaCB-(206)	%	116	N/A	N/A	N/A	N/A	N/A	N/A	3855382
C13-22'33'44'5-HeptaCB-(170)	%	97	N/A	N/A	N/A	N/A	N/A	N/A	3855382
C13-22'33'455'66'-NonaCB-(208)	%	104	N/A	N/A	N/A	N/A	N/A	N/A	3855382
C13-22'33'55'66'-OctaCB-(202)	%	97	N/A	N/A	N/A	N/A	N/A	N/A	3855382
C13-22'33'55'6-HeptaCB-(178)	%	109	N/A	N/A	N/A	N/A	N/A	N/A	3855382
C13-22'344'55'-HeptaCB-(180)	%	95	N/A	N/A	N/A	N/A	N/A	N/A	3855382
C13-22'34'566'-HeptaCB-(188)	%	94	N/A	N/A	N/A	N/A	N/A	N/A	3855382
C13-22'44'55'HexaCB-(153) (FS)	%	85	N/A	N/A	N/A	N/A	N/A	N/A	3855382
C13-22'44'66'-HexaCB-(155)	%	84	N/A	N/A	N/A	N/A	N/A	N/A	3855382
C13-22'466'-PentaCB-(104)	%	88	N/A	N/A	N/A	N/A	N/A	N/A	3855382
C13-22'66'-TetraCB-(54)	%	53	N/A	N/A	N/A	N/A	N/A	N/A	3855382
C13-22'6-TriCB-(19)	%	60	N/A	N/A	N/A	N/A	N/A	N/A	3855382
C13-22'-DiCB-(4)	%	41	N/A	N/A	N/A	N/A	N/A	N/A	3855382
C13-233'44'55'6-OctaCB-(205)	%	109	N/A	N/A	N/A	N/A	N/A	N/A	3855382
C13-233'44'55'-HeptaCB-(189)	%	102	N/A	N/A	N/A	N/A	N/A	N/A	3855382
C13-233'44'-PentaCB-(105)	%	94	N/A	N/A	N/A	N/A	N/A	N/A	3855382
C13-233'55'-PentaCB-(111)	%	108	N/A	N/A	N/A	N/A	N/A	N/A	3855382
C13-23'44'55'-HexaCB-(167)	%	91	N/A	N/A	N/A	N/A	N/A	N/A	3855382
C13-2344'5-PentaCB-(114)	%	92	N/A	N/A	N/A	N/A	N/A	N/A	3855382
C13-23'44'5-PentaCB-(118)	%	92	N/A	N/A	N/A	N/A	N/A	N/A	3855382
C13-2'344'5-PentaCB-(123)	%	91	N/A	N/A	N/A	N/A	N/A	N/A	3855382
C13-2-MonoCB-(1)	%	39	N/A	N/A	N/A	N/A	N/A	N/A	3855382
C13-33'44'55'-HexaCB-(169)	%	93	N/A	N/A	N/A	N/A	N/A	N/A	3855382
C13-33'44'5-PentaCB-(126)	%	94	N/A	N/A	N/A	N/A	N/A	N/A	3855382

EDL = Estimated Detection Limit

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RESULTS OF ANALYSES OF STACK SAMPLING TRAIN

Maxxam ID		YT2091							
Sampling Date		2014/12/03 09:00				TOXIC EQUIVALENCY		# of	
	Units	M23-3	EDL	RDL	MDL	TEF (2005 WHO)	TEQ(DL)	Isomers	QC Batch
C13-33'44'-TetraCB-(77)	%	92	N/A	N/A	N/A	N/A	N/A	N/A	3855382
C13-344'5-TetraCB-(81)	%	92	N/A	N/A	N/A	N/A	N/A	N/A	3855382
C13-344'-TriCB-(37)	%	92	N/A	N/A	N/A	N/A	N/A	N/A	3855382
C13-44'-DiCB-(15)	%	78	N/A	N/A	N/A	N/A	N/A	N/A	3855382
C13-4-MonoCB-(3)	%	58	N/A	N/A	N/A	N/A	N/A	N/A	3855382
C13-DecaCB-(209)	%	93	N/A	N/A	N/A	N/A	N/A	N/A	3855382
C13-HexaCB-(156)+(157)	%	90	N/A	N/A	N/A	N/A	N/A	N/A	3855382

EDL = Estimated Detection Limit

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TEF = Toxic Equivalency Factor, TEQ = Toxic Equivalency Quotient,
The Total Toxic Equivalency (TEQ) value reported is the sum of Toxic Equivalent Quotients for the congeners tested.

WHO(2005): The 2005 World Health Organization, Human and Mammalian Toxic Equivalency Factors for Dioxins and Dioxin-like Compounds

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CEM Services Inc
Client Project #: L&RR
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Your P.O. #: 74229

TEST SUMMARY

Maxxam ID: YT2089
Sample ID: M23-1
Matrix: Stack Sampling Train

Collected: 2014/12/02
Shipped:
Received: 2014/12/05

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
2,3,7,8-TCDF Confirmation (M23)	HRMS/MS	3861708	N/A	2014/12/16	Vica Cioranic
Dioxins/Furans in Air (Method 23)	HRMS/MS	3859768	2014/12/11	2014/12/15	Kay Shaw
PCBs by HRMS (1668A)	HRMS/MS	3855382	2014/12/10	2014/12/15	Cathy Xu

Maxxam ID: YT2090
Sample ID: M23-2
Matrix: Stack Sampling Train

Collected: 2014/12/02
Shipped:
Received: 2014/12/05

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Dioxins/Furans in Air (Method 23)	HRMS/MS	3859768	2014/12/11	2014/12/15	Kay Shaw
PCBs by HRMS (1668A)	HRMS/MS	3855382	2014/12/10	2014/12/16	Cathy Xu

Maxxam ID: YT2091
Sample ID: M23-3
Matrix: Stack Sampling Train

Collected: 2014/12/03
Shipped:
Received: 2014/12/05

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
2,3,7,8-TCDF Confirmation (M23)	HRMS/MS	3861708	N/A	2014/12/16	Vica Cioranic
Dioxins/Furans in Air (Method 23)	HRMS/MS	3859768	2014/12/11	2014/12/15	Kay Shaw
PCBs by HRMS (1668A)	HRMS/MS	3855382	2014/12/10	2014/12/16	Cathy Xu

Maxxam Job #: B4N0984
Report Date: 2014/12/18

CEM Services Inc
Client Project #: L&RR
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GENERAL COMMENTS

Results relate only to the items tested.

Maxxam Analytics International Corporation o/a Maxxam Analytics 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.maxxam.ca

Maxxam Job #: B4N0984
Report Date: 2014/12/18

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QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	Units	QC Limits
3855382	CXU	Spiked Blank	C13-2,44'-TriCB-(28)	2014/12/15		65	%	40 - 125
			C13-22'33'44'55'6-NonaCB-(206)	2014/12/15		115	%	30 - 140
			C13-22'33'44'5-HeptaCB-(170)	2014/12/15		103	%	30 - 140
			C13-22'33'455'66'-NonaCB-(208)	2014/12/15		116	%	30 - 140
			C13-22'33'55'66'-OctaCB-(202)	2014/12/15		111	%	30 - 140
			C13-22'33'55'6-HeptaCB-(178)	2014/12/15		114	%	40 - 125
			C13-22'344'55'-HeptaCB-(180)	2014/12/15		101	%	30 - 140
			C13-22'34'566'-HeptaCB-(188)	2014/12/15		105	%	30 - 140
			C13-22'44'66'-HexaCB-(155)	2014/12/15		91	%	30 - 140
			C13-22'466'-PentaCB-(104)	2014/12/15		80	%	30 - 140
			C13-22'66'-TetraCB-(54)	2014/12/15		53	%	30 - 140
			C13-22'6-TriCB-(19)	2014/12/15		44	%	30 - 140
			C13-22'-DiCB-(4)	2014/12/15		32	%	30 - 140
			C13-233'44'55'6-OctaCB-(205)	2014/12/15		121	%	30 - 140
			C13-233'44'55'-HeptaCB-(189)	2014/12/15		107	%	30 - 140
			C13-233'44'-PentaCB-(105)	2014/12/15		101	%	30 - 140
			C13-233'55'-PentaCB-(111)	2014/12/15		111	%	40 - 125
			C13-23'44'55'-HexaCB-(167)	2014/12/15		92	%	30 - 140
			C13-2344'5-PentaCB-(114)	2014/12/15		98	%	30 - 140
			C13-23'44'5-PentaCB-(118)	2014/12/15		98	%	30 - 140
			C13-2'344'5-PentaCB-(123)	2014/12/15		98	%	30 - 140
			C13-2-MonoCB-(1)	2014/12/15		25	%	15 - 140
			C13-33'44'55'-HexaCB-(169)	2014/12/15		90	%	30 - 140
			C13-33'44'5-PentaCB-(126)	2014/12/15		96	%	30 - 140
			C13-33'44'-TetraCB-(77)	2014/12/15		95	%	30 - 140
			C13-344'5-TetraCB-(81)	2014/12/15		98	%	30 - 140
			C13-344'-TriCB-(37)	2014/12/15		81	%	30 - 140
			C13-44'-DiCB-(15)	2014/12/15		49	%	30 - 140
			C13-4-MonoCB-(3)	2014/12/15		31	%	15 - 140
			C13-DecaCB-(209)	2014/12/15		102	%	30 - 140
			C13-HexaCB-(156)+(157)	2014/12/15		89	%	30 - 140
			2-MonoCB-(1)	2014/12/15		94	%	50 - 150
			4-MonoCB-(3)	2014/12/15		85	%	50 - 150
			22'-DiCB-(4)	2014/12/15		89	%	50 - 150
			4,4'-DiCB-(15)	2014/12/15		92	%	50 - 150
			22'6-TriCB-(19)	2014/12/15		85	%	50 - 150
			235-TriCB-(23)	2014/12/15		76	%	50 - 150
			23'5'-TriCB-(34)	2014/12/15		58	%	50 - 150
			344'-TriCB-(37)	2014/12/15		93	%	50 - 150
			22'66'-TetraCB-(54)	2014/12/15		93	%	50 - 150
			33'44'-TetraCB-(77)	2014/12/15		94	%	50 - 150
			344'5-TetraCB-(81)	2014/12/15		93	%	50 - 150
			22'466'-PentaCB-(104)	2014/12/15		86	%	50 - 150
			233'44'-PentaCB-(105)	2014/12/15		90	%	50 - 150
			2344'5-PentaCB-(114)	2014/12/15		92	%	50 - 150
			23'44'5-PentaCB-(118)	2014/12/15		95	%	50 - 150
			23'44'5'-PentaCB-(123)	2014/12/15		92	%	50 - 150
			33'44'5-PentaCB-(126)	2014/12/15		90	%	50 - 150
			22'44'66'-HexaCB-(155)	2014/12/15		89	%	50 - 150
			HexaCB-(156)+(157)	2014/12/15		94	%	50 - 150
			23'44'55'-HexaCB-(167)	2014/12/15		92	%	50 - 150
			33'44'55'-HexaCB-(169)	2014/12/15		92	%	50 - 150

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	Units	QC Limits
			22'33'44'5-HeptaCB-(170)	2014/12/15		89	%	50 - 150
			HeptaCB-(180)+(193)	2014/12/15		78	%	50 - 150
			22'344'56'-HeptaCB-(182)	2014/12/15		83	%	50 - 150
			22'34'55'6-HeptaCB-(187)	2014/12/15		90	%	50 - 150
			22'34'566'-HeptaCB-(188)	2014/12/15		86	%	50 - 150
			233'44'55'-HeptaCB-(189)	2014/12/15		92	%	50 - 150
			22'33'55'66'-OctaCB-(202)	2014/12/15		87	%	50 - 150
			233'44'55'6-OctaCB-(205)	2014/12/15		78	%	50 - 150
			22'33'44'55'6-NonaCB-(206)	2014/12/15		84	%	50 - 150
			22'33'455'66'-NonaCB-(208)	2014/12/15		85	%	50 - 150
			DecaCB-(209)	2014/12/15		90	%	50 - 150
3855382	CXU	Spiked Blank DUP	C13-2,44'-TriCB-(28)	2014/12/15		78	%	40 - 125
			C13-22'33'44'55'6-NonaCB-(206)	2014/12/15		107	%	30 - 140
			C13-22'33'44'5-HeptaCB-(170)	2014/12/15		96	%	30 - 140
			C13-22'33'455'66'-NonaCB-(208)	2014/12/15		105	%	30 - 140
			C13-22'33'55'66'-OctaCB-(202)	2014/12/15		94	%	30 - 140
			C13-22'33'55'6-HeptaCB-(178)	2014/12/15		100	%	40 - 125
			C13-22'344'55'-HeptaCB-(180)	2014/12/15		98	%	30 - 140
			C13-22'34'566'-HeptaCB-(188)	2014/12/15		92	%	30 - 140
			C13-22'44'66'-HexaCB-(155)	2014/12/15		77	%	30 - 140
			C13-22'466'-PentaCB-(104)	2014/12/15		74	%	30 - 140
			C13-22'66'-TetraCB-(54)	2014/12/15		53	%	30 - 140
			C13-22'6-TriCB-(19)	2014/12/15		54	%	30 - 140
			C13-22'-DiCB-(4)	2014/12/15		43	%	30 - 140
			C13-233'44'55'6-OctaCB-(205)	2014/12/15		118	%	30 - 140
			C13-233'44'55'-HeptaCB-(189)	2014/12/15		109	%	30 - 140
			C13-233'44'-PentaCB-(105)	2014/12/15		101	%	30 - 140
			C13-233'55'-PentaCB-(111)	2014/12/15		101	%	40 - 125
			C13-23'44'55'-HexaCB-(167)	2014/12/15		104	%	30 - 140
			C13-2344'5-PentaCB-(114)	2014/12/15		99	%	30 - 140
			C13-23'44'5-PentaCB-(118)	2014/12/15		98	%	30 - 140
			C13-2'344'5-PentaCB-(123)	2014/12/15		99	%	30 - 140
			C13-2-MonoCB-(1)	2014/12/15		46	%	15 - 140
			C13-33'44'55'-HexaCB-(169)	2014/12/15		100	%	30 - 140
			C13-33'44'5-PentaCB-(126)	2014/12/15		104	%	30 - 140
			C13-33'44'-TetraCB-(77)	2014/12/15		91	%	30 - 140
			C13-344'5-TetraCB-(81)	2014/12/15		85	%	30 - 140
			C13-344'-TriCB-(37)	2014/12/15		82	%	30 - 140
			C13-44'-DiCB-(15)	2014/12/15		57	%	30 - 140
			C13-4-MonoCB-(3)	2014/12/15		51	%	15 - 140
			C13-DecaCB-(209)	2014/12/15		89	%	30 - 140
			C13-HexaCB-(156)+(157)	2014/12/15		102	%	30 - 140
			2-MonoCB-(1)	2014/12/15		93	%	50 - 150
			4-MonoCB-(3)	2014/12/15		91	%	50 - 150
			22'-DiCB-(4)	2014/12/15		99	%	50 - 150
			4,4'-DiCB-(15)	2014/12/15		101	%	50 - 150
			22'6-TriCB-(19)	2014/12/15		90	%	50 - 150
			235-TriCB-(23)	2014/12/15		88	%	50 - 150
			23'5'-TriCB-(34)	2014/12/15		69	%	50 - 150
			344'-TriCB-(37)	2014/12/15		96	%	50 - 150
			22'66'-TetraCB-(54)	2014/12/15		99	%	50 - 150
			33'44'-TetraCB-(77)	2014/12/15		98	%	50 - 150

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	Units	QC Limits
			344'5-TetraCB-(81)	2014/12/15		103	%	50 - 150
			22'466'-PentaCB-(104)	2014/12/15		90	%	50 - 150
			233'44'-PentaCB-(105)	2014/12/15		97	%	50 - 150
			2344'5-PentaCB-(114)	2014/12/15		98	%	50 - 150
			23'44'5-PentaCB-(118)	2014/12/15		98	%	50 - 150
			23'44'5'-PentaCB-(123)	2014/12/15		95	%	50 - 150
			33'44'5-PentaCB-(126)	2014/12/15		94	%	50 - 150
			22'44'66'-HexaCB-(155)	2014/12/15		94	%	50 - 150
			HexaCB-(156)+(157)	2014/12/15		96	%	50 - 150
			23'44'55'-HexaCB-(167)	2014/12/15		95	%	50 - 150
			33'44'55'-HexaCB-(169)	2014/12/15		97	%	50 - 150
			22'33'44'5-HeptaCB-(170)	2014/12/15		93	%	50 - 150
			HeptaCB-(180)+(193)	2014/12/15		75	%	50 - 150
			22'344'56'-HeptaCB-(182)	2014/12/15		75	%	50 - 150
			22'34'55'6-HeptaCB-(187)	2014/12/15		81	%	50 - 150
			22'34'566'-HeptaCB-(188)	2014/12/15		90	%	50 - 150
			233'44'55'-HeptaCB-(189)	2014/12/15		92	%	50 - 150
			22'33'55'66'-OctaCB-(202)	2014/12/15		92	%	50 - 150
			233'44'55'6-OctaCB-(205)	2014/12/15		79	%	50 - 150
			22'33'44'55'6-NonaCB-(206)	2014/12/15		82	%	50 - 150
			22'33'455'66'-NonaCB-(208)	2014/12/15		86	%	50 - 150
			DecaCB-(209)	2014/12/15		94	%	50 - 150
3855382	CXU	RPD	2-MonoCB-(1)	2014/12/15	1.1		%	30
			4-MonoCB-(3)	2014/12/15	6.8		%	30
			22'-DiCB-(4)	2014/12/15	11		%	30
			4,4'-DiCB-(15)	2014/12/15	9.3		%	30
			22'6-TriCB-(19)	2014/12/15	5.7		%	30
			235-TriCB-(23)	2014/12/15	15		%	30
			23'5'-TriCB-(34)	2014/12/15	17		%	30
			344'-TriCB-(37)	2014/12/15	3.2		%	30
			22'66'-TetraCB-(54)	2014/12/15	6.3		%	30
			33'44'-TetraCB-(77)	2014/12/15	4.2		%	30
			344'5-TetraCB-(81)	2014/12/15	10		%	30
			22'466'-PentaCB-(104)	2014/12/15	4.5		%	30
			233'44'-PentaCB-(105)	2014/12/15	7.5		%	30
			2344'5-PentaCB-(114)	2014/12/15	6.3		%	30
			23'44'5-PentaCB-(118)	2014/12/15	3.1		%	30
			23'44'5'-PentaCB-(123)	2014/12/15	3.2		%	30
			33'44'5-PentaCB-(126)	2014/12/15	4.3		%	30
			22'44'66'-HexaCB-(155)	2014/12/15	5.5		%	30
			HexaCB-(156)+(157)	2014/12/15	2.1		%	30
			23'44'55'-HexaCB-(167)	2014/12/15	3.2		%	30
			33'44'55'-HexaCB-(169)	2014/12/15	5.3		%	30
			22'33'44'5-HeptaCB-(170)	2014/12/15	4.4		%	30
			HeptaCB-(180)+(193)	2014/12/15	3.9		%	30
			22'344'56'-HeptaCB-(182)	2014/12/15	10		%	30
			22'34'55'6-HeptaCB-(187)	2014/12/15	11		%	30
			22'34'566'-HeptaCB-(188)	2014/12/15	4.5		%	30
			233'44'55'-HeptaCB-(189)	2014/12/15	0		%	30
			22'33'55'66'-OctaCB-(202)	2014/12/15	5.6		%	30
			233'44'55'6-OctaCB-(205)	2014/12/15	1.3		%	30
			22'33'44'55'6-NonaCB-(206)	2014/12/15	2.4		%	30

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	Units	QC Limits
			22'33'455'66'-NonaCB-(208)	2014/12/15	1.2		%	30
			DecaCB-(209)	2014/12/15	4.3		%	30
3855382	CXU	Method Blank	C13-2,44'-TriCB-(28)	2014/12/15		78	%	40 - 125
			C13-22'33'44'55'6-NonaCB-(206)	2014/12/15		104	%	30 - 140
			C13-22'33'44'5-HeptaCB-(170)	2014/12/15		93	%	30 - 140
			C13-22'33'455'66'-NonaCB-(208)	2014/12/15		101	%	30 - 140
			C13-22'33'55'66'-OctaCB-(202)	2014/12/15		96	%	30 - 140
			C13-22'33'55'6-HeptaCB-(178)	2014/12/15		115	%	40 - 125
			C13-22'344'55'-HeptaCB-(180)	2014/12/15		96	%	30 - 140
			C13-22'34'566'-HeptaCB-(188)	2014/12/15		100	%	30 - 140
			C13-22'44'66'-HexaCB-(155)	2014/12/15		113	%	30 - 140
			C13-22'466'-PentaCB-(104)	2014/12/15		84	%	30 - 140
			C13-22'66'-TetraCB-(54)	2014/12/15		65	%	30 - 140
			C13-22'6-TriCB-(19)	2014/12/15		54	%	30 - 140
			C13-22'-DiCB-(4)	2014/12/15		39	%	30 - 140
			C13-233'44'55'6-OctaCB-(205)	2014/12/15		119	%	30 - 140
			C13-233'44'55'-HeptaCB-(189)	2014/12/15		108	%	30 - 140
			C13-233'44'-PentaCB-(105)	2014/12/15		88	%	30 - 140
			C13-233'55'-PentaCB-(111)	2014/12/15		102	%	40 - 125
			C13-23'44'55'-HexaCB-(167)	2014/12/15		107	%	30 - 140
			C13-2344'5-PentaCB-(114)	2014/12/15		89	%	30 - 140
			C13-23'44'5-PentaCB-(118)	2014/12/15		89	%	30 - 140
			C13-2'344'5-PentaCB-(123)	2014/12/15		89	%	30 - 140
			C13-2-MonoCB-(1)	2014/12/15		31	%	15 - 140
			C13-33'44'55'-HexaCB-(169)	2014/12/15		100	%	30 - 140
			C13-33'44'5-PentaCB-(126)	2014/12/15		90	%	30 - 140
			C13-33'44'-TetraCB-(77)	2014/12/15		92	%	30 - 140
			C13-344'5-TetraCB-(81)	2014/12/15		92	%	30 - 140
			C13-344'-TriCB-(37)	2014/12/15		91	%	30 - 140
			C13-44'-DiCB-(15)	2014/12/15		58	%	30 - 140
			C13-4-MonoCB-(3)	2014/12/15		37	%	15 - 140
			C13-DecaCB-(209)	2014/12/15		87	%	30 - 140
			C13-HexaCB-(156)+(157)	2014/12/15		103	%	30 - 140
			2-MonoCB-(1)	2014/12/15	<0.080		ng	
			3-MonoCB-(2)	2014/12/15	<0.075		ng	
			4-MonoCB-(3)	2014/12/15	<0.076		ng	
			22'-DiCB-(4)	2014/12/15	<0.77		ng	
			2,3-DiCB-(5)	2014/12/15	<0.37		ng	
			2,3'-DiCB-(6)	2014/12/15	<0.33		ng	
			2,4-DiCB-(7)	2014/12/15	<0.35		ng	
			2,4'-DiCB-(8)	2014/12/15	<0.31		ng	
			2,5-DiCB-(9)	2014/12/15	<0.32		ng	
			2,6-DiCB-(10)	2014/12/15	<0.75		ng	
			3,3'-DiCB-(11)	2014/12/15	<0.34		ng	
			DiCB-(12)+(13)	2014/12/15	<0.34		ng	
			3,5-DiCB-(14)	2014/12/15	<0.32		ng	
			4,4'-DiCB-(15)	2014/12/15	<0.55		ng	
			22'3-TriCB-(16)	2014/12/15	<0.079		ng	
			22'4-TriCB-(17)	2014/12/15	<0.064		ng	
			TriCB-(18)+(30)	2014/12/15	<0.054		ng	
			22'6-TriCB-(19)	2014/12/15	<0.057		ng	
			TriCB-(20) + (28)	2014/12/15	<0.019		ng	

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QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	Units	QC Limits
			TriCB-(21)+(33)	2014/12/15	<0.020		ng	
			234'-TriCB-(22)	2014/12/15	<0.022		ng	
			235-TriCB-(23)	2014/12/15	<0.023		ng	
			236-TriCB-(24)	2014/12/15	<0.051		ng	
			23'4-TriCB-(25)	2014/12/15	<0.018		ng	
			TriCB-(26)+(29)	2014/12/15	<0.020		ng	
			23'6-TriCB-(27)	2014/12/15	<0.044		ng	
			24'5-TriCB-(31)	2014/12/15	<0.018		ng	
			24'6-TriCB-(32)	2014/12/15	<0.041		ng	
			23'5'-TriCB-(34)	2014/12/15	<0.019		ng	
			33'4-TriCB-(35)	2014/12/15	<0.020		ng	
			33'5-TriCB-(36)	2014/12/15	<0.017		ng	
			344'-TriCB-(37)	2014/12/15	<0.031		ng	
			345-TriCB-(38)	2014/12/15	<0.020		ng	
			34'5-TriCB-(39)	2014/12/15	<0.020		ng	
			TetraCB-(40)+(41)+(71)	2014/12/15	<0.034		ng	
			22'34'-TetraCB-(42)	2014/12/15	<0.041		ng	
			22'35-TetraCB-(43)	2014/12/15	<0.048		ng	
			TetraCB-(44)+(47)+(65)	2014/12/15	<0.031		ng	
			TetraCB-(45)+(51)	2014/12/15	<0.034		ng	
			22'36'-TetraCB-(46)	2014/12/15	<0.040		ng	
			22'45-TetraCB-(48)	2014/12/15	<0.035		ng	
			TetraCB-(49)+TetraCB-(69)	2014/12/15	<0.029		ng	
			TetraCB-(50)+(53)	2014/12/15	<0.033		ng	
			22'55'-TetraCB-(52)	2014/12/15	<0.034		ng	
			22'66'-TetraCB-(54)	2014/12/15	<0.018		ng	
			233'4-TetraCB-(55)	2014/12/15	<0.012		ng	
			233'4'-Tetra CB(56)	2014/12/15	<0.012		ng	
			233'5-TetraCB-(57)	2014/12/15	<0.011		ng	
			233'5'-TetraCB-(58)	2014/12/15	<0.011		ng	
			TetraCB-(59)+(62)+(75)	2014/12/15	<0.024		ng	
			2344'-TetraCB -(60)	2014/12/15	<0.012		ng	
			TetraCB-(61)+(70)+(74)+(76)	2014/12/15	<0.011		ng	
			234'5-TetraCB-(63)	2014/12/15	<0.010		ng	
			234'6-TetraCB-(64)	2014/12/15	<0.026		ng	
			23'44'-TetraCB-(66)	2014/12/15	<0.010		ng	
			23'45-TetraCB-(67)	2014/12/15	<0.0097		ng	
			23'45'-TetraCB-(68)	2014/12/15	<0.010		ng	
			23'55'-TetraCB-(72)	2014/12/15	<0.010		ng	
			23'5'6-TetraCB-(73)	2014/12/15	<0.024		ng	
			33'44'-TetraCB-(77)	2014/12/15	<0.012		ng	
			33'45-TetraCB-(78)	2014/12/15	<0.011		ng	
			33'45'-TetraCB(79)	2014/12/15	<0.0091		ng	
			33'55'-TetraCB-(80)	2014/12/15	<0.0094		ng	
			344'5-TetraCB-(81)	2014/12/15	<0.013		ng	
			22'33'4-PentaCB-(82)	2014/12/15	<0.029		ng	
			PentaCB-(83)+(99)	2014/12/15	<0.027		ng	
			22'33'6-PentaCB-(84)	2014/12/15	<0.029		ng	
			PentaCB-(85)+(116)+(117)	2014/12/15	<0.020		ng	
			PentaCB-(86)(87)(97)(109)(119)(125)	2014/12/15	<0.022		ng	
			PentaCB-(88)+(91)	2014/12/15	<0.026		ng	
			22'346'-PentaCB-(89)	2014/12/15	<0.027		ng	

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QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	Units	QC Limits
			PentaCB-(90)+(101)+(113)	2014/12/15	<0.022		ng	
			22'355'-PentaCB-(92)	2014/12/15	<0.025		ng	
			PentaCB-(93)+(98)+(100)+(102)	2014/12/15	<0.026		ng	
			22'356'-PentaCB-(94)	2014/12/15	<0.029		ng	
			22'35'6-PentaCB-(95)	2014/12/15	<0.024		ng	
			22'366'-PentaCB-(96)	2014/12/15	<0.0088		ng	
			22'45'6-PentaCB-(103)	2014/12/15	<0.022		ng	
			22'466'-PentaCB-(104)	2014/12/15	<0.0081		ng	
			233'44'-PentaCB-(105)	2014/12/15	<0.026		ng	
			233'45-PentaCB-(106)	2014/12/15	<0.022		ng	
			233'4'5-PentaCB-(107)	2014/12/15	<0.019		ng	
			PentaCB-(108)+(124)	2014/12/15	<0.022		ng	
			PentaCB-(110)+(115)	2014/12/15	<0.021		ng	
			233'55'-PentaCB-(111)	2014/12/15	<0.019		ng	
			233'56-PentaCB-(112)	2014/12/15	<0.018		ng	
			2344'5-PentaCB-(114)	2014/12/15	<0.025		ng	
			23'44'5-PentaCB-(118)	2014/12/15	<0.026		ng	
			23'455'-PentaCB-(120)	2014/12/15	<0.017		ng	
			23'45'6-PentaCB-(121)	2014/12/15	<0.019		ng	
			233'4'5'-PentaCB-(122)	2014/12/15	<0.023		ng	
			23'44'5'-PentaCB-(123)	2014/12/15	<0.028		ng	
			33'44'5-PentaCB-(126)	2014/12/15	<0.026		ng	
			33'455'-PentaCB-(127)	2014/12/15	<0.021		ng	
			HexaCB-(128)+(166)	2014/12/15	<0.035		ng	
			HexaCB-(129)+(138)+(163)	2014/12/15	<0.039		ng	
			22'33'45'-HexaCB-(130)	2014/12/15	<0.046		ng	
			22'33'46-HexaCB-(131)	2014/12/15	<0.049		ng	
			22'33'46'-HexaCB-(132)	2014/12/15	<0.047		ng	
			22'33'55'-HexaCB-(133)	2014/12/15	<0.041		ng	
			HexaCB-(134)+(143)	2014/12/15	<0.046		ng	
			HexaCB-(135)+(151)	2014/12/15	<0.013		ng	
			22'33'66'-HexaCB-(136)	2014/12/15	<0.0092		ng	
			22'344'5-HexaCB-(137)	2014/12/15	<0.045		ng	
			HexaCB-(139)+(140)	2014/12/15	<0.039		ng	
			22'3455'-HexaCB-(141)	2014/12/15	<0.040		ng	
			22'3456-HexaCB-(142)	2014/12/15	<0.045		ng	
			22'345'6-HexaCB-(144)	2014/12/15	<0.012		ng	
			22'3466'-HexaCB-(145)	2014/12/15	<0.010		ng	
			22'34'55'-HexaCB-(146)	2014/12/15	<0.036		ng	
			HexaCB-(147)+(149)	2014/12/15	<0.038		ng	
			22'34'56'-HexaCB-(148)	2014/12/15	<0.012		ng	
			22'34'66'-HexaCB-(150)	2014/12/15	<0.0096		ng	
			22'3566'-HexaCB-(152)	2014/12/15	<0.0088		ng	
			HexaCB-(153)+(168)	2014/12/15	<0.032		ng	
			22'44'56'-HexaCB-(154)	2014/12/15	<0.011		ng	
			22'44'66'-HexaCB-(155)	2014/12/15	<0.0093		ng	
			HexaCB-(156)+(157)	2014/12/15	<0.018		ng	
			233'44'6-HexaCB-(158)	2014/12/15	<0.027		ng	
			233'455'-HexaCB-(159)	2014/12/15	<0.016		ng	
			233'456-HexaCB-(160)	2014/12/15	<0.033		ng	
			233'45'6-HexaCB-(161)	2014/12/15	<0.030		ng	
			233'4'55'-HexaCB-(162)	2014/12/15	<0.016		ng	

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QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	Units	QC Limits
			233'4'5'6-HexaCB-(164)	2014/12/15	<0.029		ng	
			233'55'6-HexaCB-(165)	2014/12/15	<0.034		ng	
			23'44'55'-HexaCB-(167)	2014/12/15	<0.019		ng	
			33'44'55'-HexaCB-(169)	2014/12/15	<0.019		ng	
			22'33'44'5-HeptaCB-(170)	2014/12/15	<0.030		ng	
			HeptaCB-(171)+(173)	2014/12/15	<0.045		ng	
			22'33'455'-HeptaCB-(172)	2014/12/15	<0.046		ng	
			22'33'456'-HeptaCB-(174)	2014/12/15	<0.043		ng	
			22'33'45'6-HeptaCB-(175)	2014/12/15	<0.018		ng	
			22'33'466'-HeptaCB-(176)	2014/12/15	<0.013		ng	
			22'33'45'6'-HeptaCB-(177)	2014/12/15	<0.045		ng	
			22'33'55'6-HeptaCB-(178)	2014/12/15	<0.019		ng	
			22'33'566'-HeptaCB-(179)	2014/12/15	<0.013		ng	
			HeptaCB-(180)+(193)	2014/12/15	<0.028		ng	
			22'344'56-HeptaCB-(181)	2014/12/15	<0.045		ng	
			22'344'56'-HeptaCB-(182)	2014/12/15	<0.018		ng	
			22'344'5'6-HeptaCB-(183)	2014/12/15	<0.037		ng	
			22'344'66'-HeptaCB-(184)	2014/12/15	<0.013		ng	
			22'3455'6-HeptaCB-(185)	2014/12/15	<0.046		ng	
			22'34566'-HeptaCB-(186)	2014/12/15	<0.015		ng	
			22'34'55'6-HeptaCB-(187)	2014/12/15	<0.018		ng	
			22'34'566'-HeptaCB-(188)	2014/12/15	<0.015		ng	
			233'44'55'-HeptaCB-(189)	2014/12/15	<0.021		ng	
			233'44'56-HeptaCB-(190)	2014/12/15	<0.033		ng	
			233'44'5'6-HeptaCB-(191)	2014/12/15	<0.032		ng	
			233'455'6-HeptaCB-(192)	2014/12/15	<0.037		ng	
			22'33'44'55'-OctaCB-(194)	2014/12/15	<0.018		ng	
			22'33'44'56-OctaCB-(195)	2014/12/15	<0.020		ng	
			22'33'44'56'-OctaCB-(196)	2014/12/15	<0.027		ng	
			22'33'44'66'OctaCB-(197)	2014/12/15	<0.022		ng	
			OctaCB-(198)+(199)	2014/12/15	<0.028		ng	
			22'33'4566'-OctaCB-(200)	2014/12/15	<0.019		ng	
			22'33'45'66'-OctaCB-(201)	2014/12/15	<0.019		ng	
			22'33'55'66'-OctaCB-(202)	2014/12/15	<0.022		ng	
			22'344'55'6-OctaCB-(203)	2014/12/15	<0.027		ng	
			22'344'566'-OctaCB-(204)	2014/12/15	<0.020		ng	
			233'44'55'6-OctaCB-(205)	2014/12/15	<0.015		ng	
			22'33'44'55'6-NonaCB-(206)	2014/12/15	<0.035		ng	
			22'33'44'566'-NonaCB-(207)	2014/12/15	<0.027		ng	
			22'33'455'66'-NonaCB-(208)	2014/12/15	<0.033		ng	
			DecaCB-(209)	2014/12/15	<0.026		ng	
			Monochlorobiphenyl	2014/12/15	<0.080		ng	
			Dichlorobiphenyl	2014/12/15	<0.77		ng	
			Trichlorobiphenyl	2014/12/15	<0.079		ng	
			Tetrachlorobiphenyl	2014/12/15	<0.048		ng	
			Pentachlorobiphenyl	2014/12/15	<0.029		ng	
			Hexachlorobiphenyl	2014/12/15	<0.049		ng	
			Heptachlorobiphenyl	2014/12/15	<0.046		ng	
			Octachlorobiphenyl	2014/12/15	<0.028		ng	
			Nonachlorobiphenyl	2014/12/15	<0.035		ng	
			Decachlorobiphenyl	2014/12/15	<0.026		ng	
3859768	KKS	Spiked Blank	C13-1234678 HeptaCDD	2014/12/15		72	%	25 - 130

Maxxam Job #: B4N0984
Report Date: 2014/12/18

CEM Services Inc
Client Project #: L&RR
Site Location: L&RR
Your P.O. #: 74229

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	Units	QC Limits
			C13-1234678 HeptaCDF	2014/12/15		79	%	25 - 130
			C13-123678 HexaCDD	2014/12/15		75	%	40 - 130
			C13-123678 HexaCDF	2014/12/15		102	%	40 - 130
			C13-12378 PentaCDD	2014/12/15		89	%	40 - 130
			C13-12378 PentaCDF	2014/12/15		117	%	40 - 130
			C13-123789 HexaCDF	2014/12/15		73	%	40 - 130
			C13-2378 TetraCDD	2014/12/15		84	%	40 - 130
			C13-2378 TetraCDF	2014/12/15		84	%	40 - 130
			C13-Octachlorodibenzo-p-Dioxin	2014/12/15		60	%	25 - 130
			2,3,7,8-Tetra CDD	2014/12/15		109	%	80 - 140
			1,2,3,7,8-Penta CDD	2014/12/15		117	%	80 - 140
			1,2,3,4,7,8-Hexa CDD	2014/12/15		102	%	80 - 140
			1,2,3,6,7,8-Hexa CDD	2014/12/15		108	%	80 - 140
			1,2,3,7,8,9-Hexa CDD	2014/12/15		120	%	80 - 140
			1,2,3,4,6,7,8-Hepta CDD	2014/12/15		104	%	80 - 140
			1,2,3,4,6,7,8,9-Octa CDD	2014/12/15		99	%	80 - 140
			2,3,7,8-Tetra CDF	2014/12/15		112	%	80 - 140
			1,2,3,7,8-Penta CDF	2014/12/15		97	%	80 - 140
			2,3,4,7,8-Penta CDF	2014/12/15		85	%	80 - 140
			1,2,3,4,7,8-Hexa CDF	2014/12/15		85	%	80 - 140
			1,2,3,6,7,8-Hexa CDF	2014/12/15		89	%	80 - 140
			2,3,4,6,7,8-Hexa CDF	2014/12/15		83	%	80 - 140
			1,2,3,7,8,9-Hexa CDF	2014/12/15		85	%	80 - 140
			1,2,3,4,6,7,8-Hepta CDF	2014/12/15		103	%	80 - 140
			1,2,3,4,7,8,9-Hepta CDF	2014/12/15		91	%	80 - 140
			1,2,3,4,6,7,8,9-Octa CDF	2014/12/15		119	%	80 - 140
3859768	KKS	Spiked Blank DUP	C13-1234678 HeptaCDD	2014/12/15		81	%	25 - 130
			C13-1234678 HeptaCDF	2014/12/15		89	%	25 - 130
			C13-123678 HexaCDD	2014/12/15		83	%	40 - 130
			C13-123678 HexaCDF	2014/12/15		113	%	40 - 130
			C13-12378 PentaCDD	2014/12/15		97	%	40 - 130
			C13-12378 PentaCDF	2014/12/15		126	%	40 - 130
			C13-123789 HexaCDF	2014/12/15		82	%	40 - 130
			C13-2378 TetraCDD	2014/12/15		91	%	40 - 130
			C13-2378 TetraCDF	2014/12/15		89	%	40 - 130
			C13-Octachlorodibenzo-p-Dioxin	2014/12/15		70	%	25 - 130
			2,3,7,8-Tetra CDD	2014/12/15		108	%	80 - 140
			1,2,3,7,8-Penta CDD	2014/12/15		117	%	80 - 140
			1,2,3,4,7,8-Hexa CDD	2014/12/15		105	%	80 - 140
			1,2,3,6,7,8-Hexa CDD	2014/12/15		108	%	80 - 140
			1,2,3,7,8,9-Hexa CDD	2014/12/15		120	%	80 - 140
			1,2,3,4,6,7,8-Hepta CDD	2014/12/15		106	%	80 - 140
			1,2,3,4,6,7,8,9-Octa CDD	2014/12/15		100	%	80 - 140
			2,3,7,8-Tetra CDF	2014/12/15		115	%	80 - 140
			1,2,3,7,8-Penta CDF	2014/12/15		100	%	80 - 140
			2,3,4,7,8-Penta CDF	2014/12/15		87	%	80 - 140
			1,2,3,4,7,8-Hexa CDF	2014/12/15		86	%	80 - 140
			1,2,3,6,7,8-Hexa CDF	2014/12/15		90	%	80 - 140
			2,3,4,6,7,8-Hexa CDF	2014/12/15		82	%	80 - 140
			1,2,3,7,8,9-Hexa CDF	2014/12/15		86	%	80 - 140
			1,2,3,4,6,7,8-Hepta CDF	2014/12/15		102	%	80 - 140
			1,2,3,4,7,8,9-Hepta CDF	2014/12/15		94	%	80 - 140

Maxxam Job #: B4N0984
Report Date: 2014/12/18

CEM Services Inc
Client Project #: L&RR
Site Location: L&RR
Your P.O. #: 74229

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	Units	QC Limits
			1,2,3,4,6,7,8,9-Octa CDF	2014/12/15		119	%	80 - 140
3859768	KKS	RPD	2,3,7,8-Tetra CDD	2014/12/15	NC		%	20
			1,2,3,7,8-Penta CDD	2014/12/15	NC		%	20
			1,2,3,4,7,8-Hexa CDD	2014/12/15	NC		%	20
			1,2,3,6,7,8-Hexa CDD	2014/12/15	NC		%	20
			1,2,3,7,8,9-Hexa CDD	2014/12/15	NC		%	20
			1,2,3,4,6,7,8-Hepta CDD	2014/12/15	NC		%	20
			1,2,3,4,6,7,8,9-Octa CDD	2014/12/15	NC		%	20
			2,3,7,8-Tetra CDF	2014/12/15	NC		%	20
			1,2,3,7,8-Penta CDF	2014/12/15	NC		%	20
			2,3,4,7,8-Penta CDF	2014/12/15	NC		%	20
			1,2,3,4,7,8-Hexa CDF	2014/12/15	NC		%	20
			1,2,3,6,7,8-Hexa CDF	2014/12/15	NC		%	20
			2,3,4,6,7,8-Hexa CDF	2014/12/15	NC		%	20
			1,2,3,7,8,9-Hexa CDF	2014/12/15	NC		%	20
			1,2,3,4,6,7,8-Hepta CDF	2014/12/15	NC		%	20
			1,2,3,4,7,8,9-Hepta CDF	2014/12/15	NC		%	20
			1,2,3,4,6,7,8,9-Octa CDF	2014/12/15	NC		%	20
3859768	KKS	Method Blank	C13-1234678 HeptaCDD	2014/12/15		79	%	25 - 130
			C13-1234678 HeptaCDF	2014/12/15		91	%	25 - 130
			C13-123678 HexaCDD	2014/12/15		86	%	40 - 130
			C13-123678 HexaCDF	2014/12/15		120	%	40 - 130
			C13-12378 PentaCDD	2014/12/15		102	%	40 - 130
			C13-12378 PentaCDF	2014/12/15		128	%	40 - 130
			C13-123789 HexaCDF	2014/12/15		83	%	40 - 130
			C13-2378 TetraCDD	2014/12/15		92	%	40 - 130
			C13-2378 TetraCDF	2014/12/15		93	%	40 - 130
			C13-Octachlorodibenzo-p-Dioxin	2014/12/15		62	%	25 - 130
			2,3,7,8-Tetra CDD	2014/12/15	<3.0, EDL=3.0		pg	
			1,2,3,7,8-Penta CDD	2014/12/15	<3.1, EDL=3.1		pg	
			1,2,3,4,7,8-Hexa CDD	2014/12/15	<3.1, EDL=3.1		pg	
			1,2,3,6,7,8-Hexa CDD	2014/12/15	<3.2, EDL=3.2		pg	
			1,2,3,7,8,9-Hexa CDD	2014/12/15	<3.1, EDL=3.1		pg	
			1,2,3,4,6,7,8-Hepta CDD	2014/12/15	<3.1, EDL=3.1		pg	
			1,2,3,4,6,7,8,9-Octa CDD	2014/12/15	<5.4, EDL=5.4		pg	
			Total Tetra CDD	2014/12/15	<3.0, EDL=3.0		pg	
			Total Penta CDD	2014/12/15	<3.1, EDL=3.1		pg	
			Total Hexa CDD	2014/12/15	<4.3, EDL=4.3 (1)		pg	
			Total Hepta CDD	2014/12/15	<3.1, EDL=3.1		pg	

Maxxam Job #: B4N0984
Report Date: 2014/12/18

CEM Services Inc
Client Project #: L&RR
Site Location: L&RR
Your P.O. #: 74229

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	Units	QC Limits
			2,3,7,8-Tetra CDF	2014/12/15	<3.2, EDL=3.2		pg	
			1,2,3,7,8-Penta CDF	2014/12/15	<3.2, EDL=3.2		pg	
			2,3,4,7,8-Penta CDF	2014/12/15	<3.1, EDL=3.1		pg	
			1,2,3,4,7,8-Hexa CDF	2014/12/15	<3.1, EDL=3.1		pg	
			1,2,3,6,7,8-Hexa CDF	2014/12/15	<2.9, EDL=2.9		pg	
			2,3,4,6,7,8-Hexa CDF	2014/12/15	<3.3, EDL=3.3		pg	
			1,2,3,7,8,9-Hexa CDF	2014/12/15	<3.8, EDL=3.8		pg	
			1,2,3,4,6,7,8-Hepta CDF	2014/12/15	<2.7, EDL=2.7		pg	
			1,2,3,4,7,8,9-Hepta CDF	2014/12/15	<3.6, EDL=3.6		pg	
			1,2,3,4,6,7,8,9-Octa CDF	2014/12/15	<5.4, EDL=5.4		pg	
			Total Tetra CDF	2014/12/15	<3.2, EDL=3.2		pg	
			Total Penta CDF	2014/12/15	<3.1, EDL=3.1		pg	
			Total Hexa CDF	2014/12/15	<3.2, EDL=3.2		pg	
			Total Hepta CDF	2014/12/15	<3.1, EDL=3.1		pg	
3861708	VCI	Method Blank	Confirmation 2,3,7,8-Tetra CDF	2014/12/16	<2.2, EDL=2.2		pg	
			Confirmation C13-2378 TetraCDF	2014/12/16		98	%	40 - 135

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (one or both samples < 5x RDL).

(1) EMPC / NDR - Peak detected does not meet ratio criteria and has resulted in an elevated detection limit.

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Maxxam Job #: B4N0984
Report Date: 2014/12/18

CEM Services Inc
Client Project #: L&RR
Site Location: L&RR
Your P.O. #: 74229

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).

Branko Vrzic, A.SC.T., Senior Analyst, HRMS Services

Kay Shaw, C. Chem, Sr Scientific Specialist, HRMS Services

Owen Cosby, BSc.C.Chem, Supervisor, HRMS Services

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Maxxam
A Bureau Veritas Group Company

3.0 Sample Custody

Maxxam Analytics International
6740 Campobello Rd.
Mississauga, Ontario, Canada
L5N 2L8
1-800-668-0639
www.maxxamanalytics.com

Chain of Custody Form - Source

065734

Maxxam
6740 Campobello Road
Mississauga, ON L5N 2L8
www.maxxamanalytics.com
Toll Free: (800) 563-6266
Phone: (905) 817-5700
Fax: (905) 817-5777

CLIENT INFORMATION SECTION

Company Name: CEM SERVICES
Project Manager: SEAN MACKAY
e-mail: SMACKAY@CEMSERVICES.COM
Address: 360 OLD COLONY RD NORTON MA
Phone: 508 958 4387 Fax: 508 226 6778
Sampled by: S. MACKAY J. JARVIN

ANALYSIS REQUESTED

MAXXAM use only	Field Sample ID	# Bottles	Collection Date	Collection Time	Initial Impinger Charge Volumes (mL)*	PCDD/PCDF/PCB	HCL only	TO-15
	L4RR M23-1	4	12/2/14	11-2	200	✓		
	L4RR M23-2	4	12/2/14	3-6	200	✓		
	L4RR M23-3	4	12/3/14	9-12	200	✓		
	L4RR M26A-1	1	12/2/14	12-1	200		✓	
	L4RR M26A-2	1	12/2/14	4-5	200		✓	
	L4RR M26A-3	1	12/3/14	1-2	200		✓	
	L4RR M26A-BLANK	1	12/3/14	—	200		✓	
	L4RR TO-15-1 INLET	2	12/3/14	9-10	20			✓
	L4RR TO-15-2 INLET	2	12/3/14	1015-1115	20			✓
	L4RR TO-15-3 INLET	2	12/3/14	1130-1230	20			✓
	L4RR TO-15-1 OUTLET	2	12/3/14	9-10	20			✓
	L4RR TO-15-2 OUTLET	2	12/3/14	1015-1115	20			✓
	L4RR TO-15-3 OUTLET	2	12/3/14	1130-1230	20			✓

TAT Requirement
- STD 10 Business day ✓
- Rush 5 Business day
- Rush 2 Business day
- Rush 1 Business day
- Other (specify):

PROJECT INFORMATION
Project #: L4RR
Name: L4RR
PO #: 074229
Maxxam Quote #:
Maxxam Contact:

REPORTING REQUIREMENTS
- Summary Report only
- Summary Report & ✓
- Full Data Package
- EDD

PROJECT SPECIFIC COMMENTS

Client Signature: SEAN MACKAY
Affiliation: CEM SERVICES
Date/Time: 12/4/14

Received by: MAXXAM
Affiliation:
Date/Time: 12/4/14

*Initial Impinger charge volumes are required before the following analysis can be started: Method 26, CTM-027 & Method 8

Method 23 / TO9A
NATO TEF ☐ TEF x DL ☐ TEF x 0 DL ☐
WHO TEF ☐ TEF x 0.5 DL ☐

CHECKED BY 2014/12/05 13:30 B.B/B.-7/8.-B/C

COC-1600 (03/10) - Source Mississauga

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Your P.O. #: 074229
Your Project #: L&RR
Site Location: L&RR

Attention:Sean MacKay

CEM Services Inc
360 Old Colony Rd
Suite 1
Norton, MA
USA 02766

Report Date: 2014/12/18
Report #: R3261670
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B4N0995
Received: 2014/12/05, 13:30

Sample Matrix: Stack Sampling Train
Samples Received: 4

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Reference
Hydrogen Halides in H2SO4 Imp.	4	2014/12/12	2014/12/12	BRL SOP-00108	EPA 26A m
Volume of Sulfuric Acid Impinger	4	N/A	2014/12/12		

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

Encryption Key

Clayton Johnson
18 Dec 2014 10:45:56 -05:00

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Clayton Johnson, Project Manager - Air Toxics, Source Evaluation
Email: CJohnson@maxxam.ca
Phone# (905)817-5769

==========

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

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Maxxam Job #: B4N0995
Report Date: 2014/12/18

CEM Services Inc
Client Project #: L&RR
Site Location: L&RR
Your P.O. #: 074229

EPA M26A HYDROGEN HALIDES AND HALOGENS (STACK SAMPLING TRAIN)

Maxxam ID		YT2126	YT2130	YT2130	YT2131	YT2132			
Sampling Date		2014/12/03	2014/12/02 12:00	2014/12/02 12:00	2014/12/02 16:00	2014/12/03 13:00			
	Units	**M26A-BL**	**M26A-1**	**M26A-1 Lab-Dup**	**M26A-2**	**M26A-3**	**RDL**	**MDL**	**QC Batch**
Sulfuric Acid Volume	ml	300	329	N/A	340	335	1	1	3858230
Hydrochloric Acid	ug	<200	770	790	810	1000	200	60	3858239

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
N/A = Not Applicable

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Maxxam Job #: B4N0995
Report Date: 2014/12/18

CEM Services Inc
Client Project #: L&RR
Site Location: L&RR
Your P.O. #: 074229

TEST SUMMARY

Maxxam ID: YT2126
Sample ID: M26A-BL
Matrix: Stack Sampling Train

Collected: 2014/12/03
Shipped:
Received: 2014/12/05

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hydrogen Halides in H2SO4 Imp.	IC/SPEC	3858239	2014/12/12	2014/12/12	Ann-Marie Stern
Volume of Sulfuric Acid Impinger		3858230	N/A	2014/12/12	Frank Mo

Maxxam ID: YT2130
Sample ID: M26A-1
Matrix: Stack Sampling Train

Collected: 2014/12/02
Shipped:
Received: 2014/12/05

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hydrogen Halides in H2SO4 Imp.	IC/SPEC	3858239	2014/12/12	2014/12/12	Ann-Marie Stern
Volume of Sulfuric Acid Impinger		3858230	N/A	2014/12/12	Frank Mo

Maxxam ID: YT2130 Dup
Sample ID: M26A-1
Matrix: Stack Sampling Train

Collected: 2014/12/02
Shipped:
Received: 2014/12/05

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hydrogen Halides in H2SO4 Imp.	IC/SPEC	3858239	2014/12/12	2014/12/12	Ann-Marie Stern

Maxxam ID: YT2131
Sample ID: M26A-2
Matrix: Stack Sampling Train

Collected: 2014/12/02
Shipped:
Received: 2014/12/05

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hydrogen Halides in H2SO4 Imp.	IC/SPEC	3858239	2014/12/12	2014/12/12	Ann-Marie Stern
Volume of Sulfuric Acid Impinger		3858230	N/A	2014/12/12	Frank Mo

Maxxam ID: YT2132
Sample ID: M26A-3
Matrix: Stack Sampling Train

Collected: 2014/12/03
Shipped:
Received: 2014/12/05

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hydrogen Halides in H2SO4 Imp.	IC/SPEC	3858239	2014/12/12	2014/12/12	Ann-Marie Stern
Volume of Sulfuric Acid Impinger		3858230	N/A	2014/12/12	Frank Mo

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Maxxam Job #: B4N0995
Report Date: 2014/12/18

CEM Services Inc
Client Project #: L&RR
Site Location: L&RR
Your P.O. #: 074229

GENERAL COMMENTS

Results relate only to the items tested.

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Maxxam Job #: B4N0995
Report Date: 2014/12/18

CEM Services Inc
Client Project #: L&RR
Site Location: L&RR
Your P.O. #: 074229

QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	% Recovery	Units	QC Limits
3858239	A_S	Matrix Spike(YT2130)	Hydrochloric Acid	2014/12/12		100	%	80 - 120
3858239	A_S	Spiked Blank	Hydrochloric Acid	2014/12/12		98	%	90 - 110
3858239	A_S	Method Blank	Hydrochloric Acid	2014/12/12	<200		ug	
3858239	A_S	RPD - Sample/Sample Dup	Hydrochloric Acid	2014/12/12	NC		%	20

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (one or both samples < 5x RDL).

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Maxxam Job #: B4N0995
Report Date: 2014/12/18

CEM Services Inc
Client Project #: L&RR
Site Location: L&RR
Your P.O. #: 074229

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).

Frank Mo, B.Sc., Inorganic Lab. Manager

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Your P.O. #: 074229

Your Project #: L&RR LANDFILL
Your C.O.C. #: 065734

Attention: Sean MacKay
CEM Services Inc
360 Old Colony Rd
Suite 1
Norton, MA
USA 02766

Report Date: 2015/01/20
Report #: R3307429
Version: 2R

CERTIFICATE OF ANALYSIS – REVISED REPORT

MAXXAM JOB #: B4N0852
Received: 2014/12/05, 01:30

Sample Matrix: AIR
Samples Received: 6

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Method Reference
Canister Pressure (TO-15)	6	N/A	2014/12/08	BRL SOP-00304	EPA TO-15 m
Volatile Organics in Air (TO-15) (1)	6	N/A	2014/12/08	BRL SOP-00304	EPA TO-15 m

Sample Matrix: Water
Samples Received: 6

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Method Reference
Data Package - Level 3 Volatiles	1	N/A	2014/12/09		
VOST Condensate (8260Cmod)	6	N/A	2014/12/09	CAM SOP-00226	EPA 8260C m

(1) Air sampling canisters have been cleaned in accordance with U.S. EPA Method TO14A. At the end of the cleaning, evacuation, and pressurization cycles, one canister was selected and was pressurized with Zero Air. This canister was then analyzed via TO14A on a GC/MS. The canister must have been found to contain <0.2 ppbv concentration of all target analytes in order for the batch to have been considered clean. Each canister also underwent a leak check prior to shipment.

Please Note: SUMMA® canister samples will be retained by Maxxam for a period of 5 calendar days or as contractually agreed from the date of this report, after which time they will be cleaned for reuse. If you require a longer sample storage period, please contact your service representative.

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360 Old Colony Rd
Suite 1
Norton, MA
USA 02766

Report Date: 2015/01/20
Report #: R3307429
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CERTIFICATE OF ANALYSIS – REVISED REPORT

Encryption Key

Clayton Johnson
20 Jan 2015 14:47:40 -05:00

Please direct all questions regarding this Certificate of Analysis to your Project Manager.

Clayton Johnson, Project Manager - Air Toxics, Source Evaluation
Email: CJohnson@maxxam.ca
Phone# (905) 817-5769

==========

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Total cover pages: 2

Maxxam Job #: B4N0852
Report Date: 2015/01/20

CEM Services Inc
Client Project #: L&RR LANDFILL

Your P.O. #: 074229

RESULTS OF ANALYSES OF AIR

Maxxam ID		YT1481	YT1482	YT1483	YT1484	YT1485	YT1486		
Sampling Date		2014/12/03	2014/12/03	2014/12/03	2014/12/03	2014/12/03	2014/12/03		
COC Number		065734	065734	065734	065734	065734	065734		
	Units	**L&RR TO-15-1 INLET**	**L&RR TO-15-2 INLET**	**L&RR TO-15-3 INLET**	**L&RR TO-15-1 OUTLET**	**L&RR TO-15-2 OUTLET**	**L&RR TO-15-3 OUTLET**	**MDL**	**QC Batch**
Volatile Organics									
Pressure on Receipt	psig	(-0.7)	(-0.5)	0.40	0	(-0.7)	(-1.3)	N/A	3853092

QC Batch = Quality Control Batch

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Maxxam Job #: B4N0852
Report Date: 2015/01/20

CEM Services Inc
Client Project #: L&RR LANDFILL

Your P.O. #: 074229

VOLATILE ORGANICS BY GC/MS (WATER)

Maxxam ID		YT1488			YT1489	YT1490			
Sampling Date		2014/12/03			2014/12/03	2014/12/03			
COC Number		065734			065734	065734			
	Units	**L&RR TO15-1 INLET**	**RDL**	**MDL**	**L&RR TO15-2 INLET**	**L&RR TO15-3 INLET**	**RDL**	**MDL**	**QC Batch**
Volatile Organics									
Miscellaneous Organics	N/A	TBA	TBA	N/A			TBA	N/A	3853119
Dichlorodifluoromethane (FREON 12)	ug/L	<100	100	100	<50	<50	50	50	3852937
Chloromethane	ug/L	<200	200	200	<100	<100	100	100	3852937
Vinyl Chloride	ug/L	<40	40	40	<20	<20	20	20	3852937
Bromomethane	ug/L	<300	300	300	<150	<150	150	150	3852937
Chloroethane	ug/L	<100	100	100	<50	<50	50	50	3852937
Trichlorofluoromethane (FREON 11)	ug/L	<200	200	200	<100	<100	100	100	3852937
Acetone (2-Propanone)	ug/L	2400	1500	1500	1800	1900	750	750	3852937
1,1-Dichloroethylene	ug/L	<50	50	50	<25	<25	25	25	3852937
Iodomethane	ug/L	<60	60	60	<30	<30	30	30	3852937
Carbon Disulfide	ug/L	<50	50	50	<25	<25	25	25	3852937
Methylene Chloride(Dichloromethane)	ug/L	<100	100	100	<50	<50	50	50	3852937
1,1-Dichloroethane	ug/L	<40	40	40	<20	<20	20	20	3852937
trans-1,2-Dichloroethylene	ug/L	<100	100	100	<50	<50	50	50	3852937
cis-1,2-Dichloroethylene	ug/L	<100	100	100	<50	<50	50	50	3852937
Chloroform	ug/L	<40	40	40	<20	<20	20	20	3852937
1,2-Dichloroethane	ug/L	<50	50	50	<25	<25	25	25	3852937
Methyl Ethyl Ketone (2-Butanone)	ug/L	1900	1000	1000	1500	2100	500	500	3852937
1,1,1-Trichloroethane	ug/L	<50	50	50	<25	<25	25	25	3852937
Carbon Tetrachloride	ug/L	<50	50	50	<25	<25	25	25	3852937
Benzene	ug/L	<50	50	50	<25	30	25	25	3852937
1,1,2-Trichloroethane	ug/L	<50	50	50	<25	<25	25	25	3852937
1,2-Dichloropropane	ug/L	<50	50	50	<25	<25	25	25	3852937
Trichloroethylene	ug/L	<50	50	50	<25	<25	25	25	3852937
Dibromomethane	ug/L	<50	50	50	<25	<25	25	25	3852937
Bromodichloromethane	ug/L	<40	40	40	<20	<20	20	20	3852937
cis-1,3-Dichloropropene	ug/L	<40	40	40	<20	<20	20	20	3852937
trans-1,3-Dichloropropene	ug/L	<60	60	60	<30	<30	30	30	3852937
Dibromochloromethane	ug/L	<40	40	40	<20	<20	20	20	3852937
Methyl Isobutyl Ketone	ug/L	<1000	1000	1000	<500	<500	500	500	3852937

TBA = Result to follow
RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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Maxxam Job #: B4N0852
Report Date: 2015/01/20

CEM Services Inc
Client Project #: L&RR LANDFILL

Your P.O. #: 074229

VOLATILE ORGANICS BY GC/MS (WATER)

Maxxam ID		YT1488			YT1489	YT1490			
Sampling Date		2014/12/03			2014/12/03	2014/12/03			
COC Number		065734			065734	065734			
	Units	**L&RR TO15-1 INLET**	**RDL**	**MDL**	**L&RR TO15-2 INLET**	**L&RR TO15-3 INLET**	**RDL**	**MDL**	**QC Batch**
Methyl Butyl Ketone (2-Hexanone)	ug/L	<1000	1000	1000	<500	<500	500	500	3852937
Toluene	ug/L	480	50	50	340	450	25	25	3852937
Ethylene Dibromide	ug/L	<50	50	50	<25	<25	25	25	3852937
Tetrachloroethylene	ug/L	<50	50	50	<25	<25	25	25	3852937
Chlorobenzene	ug/L	<50	50	50	<25	<25	25	25	3852937
1,1,1,2-Tetrachloroethane	ug/L	<50	50	50	<25	<25	25	25	3852937
Ethylbenzene	ug/L	130	50	50	89	120	25	25	3852937
p+m-Xylene	ug/L	290	50	50	200	260	25	25	3852937
Styrene	ug/L	<50	50	50	<25	<25	25	25	3852937
o-Xylene	ug/L	120	50	50	82	100	25	25	3852937
Bromoform	ug/L	<40	40	40	<20	<20	20	20	3852937
1,1,2,2-Tetrachloroethane	ug/L	<100	100	100	<50	<50	50	50	3852937
1,2,3-Trichloropropane	ug/L	<60	60	60	<30	<30	30	30	3852937
1,3-Dichlorobenzene	ug/L	<50	50	50	<25	<25	25	25	3852937
1,4-Dichlorobenzene	ug/L	<50	50	50	27	33	25	25	3852937
1,2-Dichlorobenzene	ug/L	<50	50	50	<25	<25	25	25	3852937
Surrogate Recovery (%)									
4-Bromofluorobenzene	%	97			96	97			3852937
D4-1,2-Dichloroethane	%	98			100	97			3852937
D8-Toluene	%	99			96	98			3852937

QC Batch = Quality Control Batch

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Maxxam Job #: B4N0852
Report Date: 2015/01/20

CEM Services Inc
Client Project #: L&RR LANDFILL

Your P.O. #: 074229

VOLATILE ORGANICS BY GC/MS (WATER)

Maxxam ID		YT1491	YT1492	YT1493			
Sampling Date		2014/12/03	2014/12/03	2014/12/03			
COC Number		065734	065734	065734			
	Units	**L&RR TO15-1 OUTLET**	**L&RR TO15-2 OUTLET**	**L&RR TO15-3 OUTLET**	**RDL**	**MDL**	**QC Batch**
Volatile Organics							
Dichlorodifluoromethane (FREON 12)	ug/L	<2.5	<2.5	<2.5	2.5	2.5	3852937
Chloromethane	ug/L	<5.0	<5.0	<5.0	5.0	5.0	3852937
Vinyl Chloride	ug/L	<1.0	<1.0	<1.0	1.0	1.0	3852937
Bromomethane	ug/L	<7.5	<7.5	<7.5	7.5	7.5	3852937
Chloroethane	ug/L	<2.5	<2.5	<2.5	2.5	2.5	3852937
Trichlorofluoromethane (FREON 11)	ug/L	<5.0	<5.0	<5.0	5.0	5.0	3852937
Acetone (2-Propanone)	ug/L	320	<38	<38	38	38	3852937
1,1-Dichloroethylene	ug/L	<1.3	<1.3	<1.3	1.3	1.3	3852937
Iodomethane	ug/L	<1.5	<1.5	<1.5	1.5	1.5	3852937
Carbon Disulfide	ug/L	<1.3	<1.3	<1.3	1.3	1.3	3852937
Methylene Chloride(Dichloromethane)	ug/L	<2.5	<2.5	<2.5	2.5	2.5	3852937
1,1-Dichloroethane	ug/L	<1.0	<1.0	<1.0	1.0	1.0	3852937
trans-1,2-Dichloroethylene	ug/L	<2.5	<2.5	<2.5	2.5	2.5	3852937
cis-1,2-Dichloroethylene	ug/L	<2.5	<2.5	<2.5	2.5	2.5	3852937
Chloroform	ug/L	<1.0	<1.0	<1.0	1.0	1.0	3852937
1,2-Dichloroethane	ug/L	<1.3	<1.3	<1.3	1.3	1.3	3852937
Methyl Ethyl Ketone (2-Butanone)	ug/L	<25	<25	<25	25	25	3852937
1,1,1-Trichloroethane	ug/L	<1.3	<1.3	<1.3	1.3	1.3	3852937
Carbon Tetrachloride	ug/L	<1.3	<1.3	<1.3	1.3	1.3	3852937
Benzene	ug/L	<1.3	<1.3	<1.3	1.3	1.3	3852937
1,1,2-Trichloroethane	ug/L	<1.3	<1.3	<1.3	1.3	1.3	3852937
1,2-Dichloropropane	ug/L	<1.3	<1.3	<1.3	1.3	1.3	3852937
Trichloroethylene	ug/L	<1.3	<1.3	<1.3	1.3	1.3	3852937
Dibromomethane	ug/L	<1.3	<1.3	<1.3	1.3	1.3	3852937
Bromodichloromethane	ug/L	<1.0	<1.0	<1.0	1.0	1.0	3852937
cis-1,3-Dichloropropene	ug/L	<1.0	<1.0	<1.0	1.0	1.0	3852937
trans-1,3-Dichloropropene	ug/L	<1.5	<1.5	<1.5	1.5	1.5	3852937
Dibromochloromethane	ug/L	<1.0	<1.0	<1.0	1.0	1.0	3852937
Methyl Isobutyl Ketone	ug/L	<25	<25	<25	25	25	3852937
Methyl Butyl Ketone (2-Hexanone)	ug/L	<25	<25	<25	25	25	3852937

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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Maxxam Job #: B4N0852
Report Date: 2015/01/20

CEM Services Inc
Client Project #: L&RR LANDFILL

Your P.O. #: 074229

VOLATILE ORGANICS BY GC/MS (WATER)

Maxxam ID		YT1491	YT1492	YT1493			
Sampling Date		2014/12/03	2014/12/03	2014/12/03			
COC Number		065734	065734	065734			
	Units	**L&RR TO15-1 OUTLET**	**L&RR TO15-2 OUTLET**	**L&RR TO15-3 OUTLET**	**RDL**	**MDL**	**QC Batch**
Toluene	ug/L	<1.3	<1.3	8.1	1.3	1.3	3852937
Ethylene Dibromide	ug/L	<1.3	<1.3	<1.3	1.3	1.3	3852937
Tetrachloroethylene	ug/L	<1.3	<1.3	<1.3	1.3	1.3	3852937
Chlorobenzene	ug/L	<1.3	<1.3	<1.3	1.3	1.3	3852937
1,1,1,2-Tetrachloroethane	ug/L	<1.3	<1.3	<1.3	1.3	1.3	3852937
Ethylbenzene	ug/L	<1.3	<1.3	1.3	1.3	1.3	3852937
p+m-Xylene	ug/L	<1.3	<1.3	2.1	1.3	1.3	3852937
Styrene	ug/L	<1.3	<1.3	<1.3	1.3	1.3	3852937
o-Xylene	ug/L	<1.3	<1.3	<1.3	1.3	1.3	3852937
Bromoform	ug/L	<1.0	<1.0	<1.0	1.0	1.0	3852937
1,1,2,2-Tetrachloroethane	ug/L	<2.5	<2.5	<2.5	2.5	2.5	3852937
1,2,3-Trichloropropane	ug/L	<1.5	<1.5	<1.5	1.5	1.5	3852937
1,3-Dichlorobenzene	ug/L	<1.3	<1.3	<1.3	1.3	1.3	3852937
1,4-Dichlorobenzene	ug/L	<1.3	<1.3	<1.3	1.3	1.3	3852937
1,2-Dichlorobenzene	ug/L	<1.3	<1.3	<1.3	1.3	1.3	3852937
Surrogate Recovery (%)							
4-Bromofluorobenzene	%	96	96	96			3852937
D4-1,2-Dichloroethane	%	99	97	95			3852937
D8-Toluene	%	97	98	99			3852937

QC Batch = Quality Control Batch

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Maxxam Job #: B4N0852
Report Date: 2015/01/20

CEM Services Inc
Client Project #: L&RR LANDFILL

Your P.O. #: 074229

VOLATILE ORGANICS BY GC/MS (AIR)

Maxxam ID		YT1481					
Sampling Date		2014/12/03					
COC Number		065734					
	Units	**L&RR TO-15-1 INLET**	**RDL**	**MDL**	**ug/m3**	**DL (ug/m3)**	**QC Batch**
Volatile Organics							
Dichlorodifluoromethane (FREON 12)	ppbv	120	38	19	593	188	3853498
1,2-Dichlorotetrafluoroethane	ppbv	121	32	19	846	226	3853498
Chloromethane	ppbv	63	57	19	129	118	3853498
Vinyl Chloride	ppbv	878	34	19	2240	87.4	3853498
Chloroethane	ppbv	119	57	19	314	150	3853498
1,3-Butadiene	ppbv	<95	95	19	<210	210	3853498
Trichlorofluoromethane (FREON 11)	ppbv	<38	38	19	<213	213	3853498
Ethanol (ethyl alcohol)	ppbv	<580	580	130	<1090	1090	3853498
Trichlorotrifluoroethane	ppbv	<29	29	19	<218	218	3853498
2-propanol	ppbv	<570	570	110	<1400	1400	3853498
2-Propanone	ppbv	<780	780	200	<1850	1850	3853498
Methyl Ethyl Ketone (2-Butanone)	ppbv	<570	570	110	<1680	1680	3853498
Methyl Isobutyl Ketone	ppbv	<610	610	130	<2490	2490	3853498
Methyl Butyl Ketone (2-Hexanone)	ppbv	<380	380	76	<1560	1560	3853498
Methyl t-butyl ether (MTBE)	ppbv	<38	38	19	<137	137	3853498
Ethyl Acetate	ppbv	<420	420	95	<1510	1510	3853498
1,1-Dichloroethylene	ppbv	<48	48	19	<188	188	3853498
cis-1,2-Dichloroethylene	ppbv	552	36	19	2190	143	3853498
trans-1,2-Dichloroethylene	ppbv	<38	38	19	<151	151	3853498
Methylene Chloride(Dichloromethane)	ppbv	<580	580	73	<2010	2010	3853498
Chloroform	ppbv	<29	29	19	<139	139	3853498
Carbon Tetrachloride	ppbv	<57	57	19	<359	359	3853498
1,1-Dichloroethane	ppbv	177	38	19	717	154	3853498
1,2-Dichloroethane	ppbv	<38	38	19	<154	154	3853498
Ethylene Dibromide	ppbv	<32	32	19	<248	248	3853498
1,1,1-Trichloroethane	ppbv	<57	57	19	<311	311	3853498
1,1,2-Trichloroethane	ppbv	<29	29	19	<155	155	3853498
1,1,2,2-Tetrachloroethane	ppbv	<38	38	19	<261	261	3853498
cis-1,3-Dichloropropene	ppbv	<34	34	19	<155	155	3853498
trans-1,3-Dichloropropene	ppbv	<32	32	19	<147	147	3853498

RDL = Reportable Detection Limit
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CEM Services Inc
Client Project #: L&RR LANDFILL

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VOLATILE ORGANICS BY GC/MS (AIR)

Maxxam ID		YT1481					
Sampling Date		2014/12/03					
COC Number		065734					
	Units	**L&RR TO-15-1 INLET**	**RDL**	**MDL**	**ug/m3**	**DL (ug/m3)**	**QC Batch**
1,2-Dichloropropane	ppbv	<76	76	19	<351	351	3853498
Bromomethane	ppbv	<34	34	19	<133	133	3853498
Bromoform	ppbv	<38	38	19	<393	393	3853498
Bromodichloromethane	ppbv	<38	38	19	<255	255	3853498
Dibromochloromethane	ppbv	<38	38	19	<324	324	3853498
Trichloroethylene	ppbv	70	57	19	374	306	3853498
Tetrachloroethylene	ppbv	93	38	19	632	258	3853498
Benzene	ppbv	2450	34	19	7840	109	3853498
Toluene	ppbv	35400	76	38	133000	286	3853498
Ethylbenzene	ppbv	7810	38	19	33900	165	3853498
p+m-Xylene	ppbv	13400	70	19	58300	305	3853498
o-Xylene	ppbv	3240	38	19	14100	165	3853498
Styrene	ppbv	104	38	19	441	162	3853498
4-ethyltoluene	ppbv	<420	420	95	<2050	2050	3853498
1,3,5-Trimethylbenzene	ppbv	525	95	19	2580	467	3853498
1,2,4-Trimethylbenzene	ppbv	998	95	19	4910	467	3853498
Chlorobenzene	ppbv	263	38	19	1210	175	3853498
Benzyl chloride	ppbv	<190	190	38	<984	984	3853498
1,3-Dichlorobenzene	ppbv	<76	76	19	<457	457	3853498
1,4-Dichlorobenzene	ppbv	179	76	19	1080	457	3853498
1,2-Dichlorobenzene	ppbv	<76	76	19	<457	457	3853498
1,2,4-Trichlorobenzene	ppbv	<380	380	76	<2820	2820	3853498
Hexachlorobutadiene	ppbv	<570	570	110	<6080	6080	3853498
Hexane	ppbv	2500	57	19	8830	201	3853498
Heptane	ppbv	1210	57	19	4980	234	3853498
Cyclohexane	ppbv	1050	38	19	3610	131	3853498
Tetrahydrofuran	ppbv	<76	76	19	<224	224	3853498
1,4-Dioxane	ppbv	<380	380	76	<1370	1370	3853498
Total Xylenes	ppbv	16700	110	18	72300	495	3853498
Vinyl Bromide	ppbv	<38	38	19	<166	166	3853498
Propene	ppbv	4740	57	19	8160	98.1	3853498
2,2,4-Trimethylpentane	ppbv	105	38	19	490	178	3853498

QC Batch = Quality Control Batch

Maxxam Analytics International Corporation o/a Maxxam Analytics 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.maxxam.ca

Maxxam Job #: B4N0852
Report Date: 2015/01/20

CEM Services Inc
Client Project #: L&RR LANDFILL

Your P.O. #: 074229

VOLATILE ORGANICS BY GC/MS (AIR)

Maxxam ID		YT1481					
Sampling Date		2014/12/03					
COC Number		065734					
	Units	**L&RR TO-15-1 INLET**	**RDL**	**MDL**	**ug/m3**	**DL (ug/m3)**	**QC Batch**
Carbon Disulfide	ppbv	<95	95	19	<296	296	3853498
Vinyl Acetate	ppbv	<38	38	19	<134	134	3853498
Surrogate Recovery (%)							
Bromochloromethane	%	76			N/A	N/A	3853498
D5-Chlorobenzene	%	76			N/A	N/A	3853498
Difluorobenzene	%	79			N/A	N/A	3853498

N/A = Not Applicable
QC Batch = Quality Control Batch

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Maxxam Job #: B4N0852
Report Date: 2015/01/20

CEM Services Inc
Client Project #: L&RR LANDFILL

Your P.O. #: 074229

VOLATILE ORGANICS BY GC/MS (AIR)

Maxxam ID		YT1482					
Sampling Date		2014/12/03					
COC Number		065734					
	Units	**L&RR TO-15-2 INLET**	**RDL**	**MDL**	**ug/m3**	**DL (ug/m3)**	**QC Batch**
Volatile Organics							
Dichlorodifluoromethane (FREON 12)	ppbv	120	36	18	595	178	3853498
1,2-Dichlorotetrafluoroethane	ppbv	122	31	18	850	214	3853498
Chloromethane	ppbv	<54	54	18	<112	112	3853498
Vinyl Chloride	ppbv	891	32	18	2280	82.8	3853498
Chloroethane	ppbv	112	54	18	295	142	3853498
1,3-Butadiene	ppbv	<90	90	18	<199	199	3853498
Trichlorofluoromethane (FREON 11)	ppbv	<36	36	18	<202	202	3853498
Ethanol (ethyl alcohol)	ppbv	<410	410	89	<780	780	3853498
Trichlorotrifluoroethane	ppbv	<27	27	18	<207	207	3853498
2-propanol	ppbv	<540	540	110	<1330	1330	3853498
2-Propanone	ppbv	<500	500	130	<1190	1190	3853498
Methyl Ethyl Ketone (2-Butanone)	ppbv	<540	540	110	<1590	1590	3853498
Methyl Isobutyl Ketone	ppbv	<580	580	130	<2360	2360	3853498
Methyl Butyl Ketone (2-Hexanone)	ppbv	<360	360	72	<1470	1470	3853498
Methyl t-butyl ether (MTBE)	ppbv	<36	36	18	<130	130	3853498
Ethyl Acetate	ppbv	<400	400	91	<1430	1430	3853498
1,1-Dichloroethylene	ppbv	<45	45	18	<178	178	3853498
cis-1,2-Dichloroethylene	ppbv	536	34	18	2120	136	3853498
trans-1,2-Dichloroethylene	ppbv	<36	36	18	<143	143	3853498
Methylene Chloride(Dichloromethane)	ppbv	<320	320	40	<1110	1110	3853498
Chloroform	ppbv	<27	27	18	<132	132	3853498
Carbon Tetrachloride	ppbv	<54	54	18	<340	340	3853498
1,1-Dichloroethane	ppbv	191	36	18	772	146	3853498
1,2-Dichloroethane	ppbv	<36	36	18	<146	146	3853498
Ethylene Dibromide	ppbv	<31	31	18	<235	235	3853498
1,1,1-Trichloroethane	ppbv	<54	54	18	<295	295	3853498
1,1,2-Trichloroethane	ppbv	<27	27	18	<147	147	3853498
1,1,2,2-Tetrachloroethane	ppbv	<36	36	18	<247	247	3853498
cis-1,3-Dichloropropene	ppbv	<32	32	18	<147	147	3853498
trans-1,3-Dichloropropene	ppbv	<31	31	18	<139	139	3853498

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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Maxxam Job #: B4N0852
Report Date: 2015/01/20

CEM Services Inc
Client Project #: L&RR LANDFILL

Your P.O. #: 074229

VOLATILE ORGANICS BY GC/MS (AIR)

Maxxam ID		YT1482					
Sampling Date		2014/12/03					
COC Number		065734					
	Units	**L&RR TO-15-2 INLET**	**RDL**	**MDL**	**ug/m3**	**DL (ug/m3)**	**QC Batch**
1,2-Dichloropropane	ppbv	<72	72	18	<333	333	3853498
Bromomethane	ppbv	<32	32	18	<126	126	3853498
Bromoform	ppbv	<36	36	18	<372	372	3853498
Bromodichloromethane	ppbv	<36	36	18	<241	241	3853498
Dibromochloromethane	ppbv	<36	36	18	<307	307	3853498
Trichloroethylene	ppbv	78	54	18	422	290	3853498
Tetrachloroethylene	ppbv	92	36	18	622	244	3853498
Benzene	ppbv	2330	32	18	7450	104	3853498
Toluene	ppbv	27300	72	36	103000	271	3853498
Ethylbenzene	ppbv	7610	36	18	33000	156	3853498
p+m-Xylene	ppbv	13100	67	18	57100	289	3853498
o-Xylene	ppbv	3160	36	18	13700	156	3853498
Styrene	ppbv	95	36	18	405	153	3853498
4-ethyltoluene	ppbv	403	400	91	1980	1950	3853498
1,3,5-Trimethylbenzene	ppbv	515	90	18	2530	442	3853498
1,2,4-Trimethylbenzene	ppbv	981	90	18	4820	442	3853498
Chlorobenzene	ppbv	265	36	18	1220	166	3853498
Benzyl chloride	ppbv	<180	180	36	<932	932	3853498
1,3-Dichlorobenzene	ppbv	<72	72	18	<433	433	3853498
1,4-Dichlorobenzene	ppbv	177	72	18	1060	433	3853498
1,2-Dichlorobenzene	ppbv	<72	72	18	<433	433	3853498
1,2,4-Trichlorobenzene	ppbv	<360	360	72	<2670	2670	3853498
Hexachlorobutadiene	ppbv	<540	540	110	<5760	5760	3853498
Hexane	ppbv	2030	54	18	7140	190	3853498
Heptane	ppbv	1140	54	18	4680	221	3853498
Cyclohexane	ppbv	992	36	18	3410	124	3853498
Tetrahydrofuran	ppbv	<72	72	18	<212	212	3853498
1,4-Dioxane	ppbv	<360	360	72	<1300	1300	3853498
Total Xylenes	ppbv	16300	110	18	70800	469	3853498
Vinyl Bromide	ppbv	<36	36	18	<157	157	3853498
Propene	ppbv	4510	54	18	7760	92.9	3853498
2,2,4-Trimethylpentane	ppbv	78	36	18	366	168	3853498

QC Batch = Quality Control Batch

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Maxxam Job #: B4N0852
Report Date: 2015/01/20

CEM Services Inc
Client Project #: L&RR LANDFILL

Your P.O. #: 074229

VOLATILE ORGANICS BY GC/MS (AIR)

Maxxam ID		YT1482					
Sampling Date		2014/12/03					
COC Number		065734					
	Units	**L&RR TO-15-2 INLET**	**RDL**	**MDL**	**ug/m3**	**DL (ug/m3)**	**QC Batch**
Carbon Disulfide	ppbv	<90	90	18	<280	280	3853498
Vinyl Acetate	ppbv	<36	36	18	<127	127	3853498
Surrogate Recovery (%)							
Bromochloromethane	%	79			N/A	N/A	3853498
D5-Chlorobenzene	%	79			N/A	N/A	3853498
Difluorobenzene	%	83			N/A	N/A	3853498

N/A = Not Applicable
QC Batch = Quality Control Batch

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Maxxam Job #: B4N0852
Report Date: 2015/01/20

CEM Services Inc
Client Project #: L&RR LANDFILL

Your P.O. #: 074229

VOLATILE ORGANICS BY GC/MS (AIR)

Maxxam ID		YT1483					
Sampling Date		2014/12/03					
COC Number		065734					
	Units	**L&RR TO-15-3 INLET**	**RDL**	**MDL**	**ug/m3**	**DL (ug/m3)**	**QC Batch**
Volatile Organics							
Dichlorodifluoromethane (FREON 12)	ppbv	138	38	19	683	188	3853498
1,2-Dichlorotetrafluoroethane	ppbv	139	32	19	975	226	3853498
Chloromethane	ppbv	<57	57	19	<118	118	3853498
Vinyl Chloride	ppbv	1070	34	19	2730	87.4	3853498
Chloroethane	ppbv	133	57	19	351	150	3853498
1,3-Butadiene	ppbv	<95	95	19	<210	210	3853498
Trichlorofluoromethane (FREON 11)	ppbv	<38	38	19	<213	213	3853498
Ethanol (ethyl alcohol)	ppbv	<440	440	96	<823	823	3853498
Trichlorotrifluoroethane	ppbv	<29	29	19	<218	218	3853498
2-propanol	ppbv	<570	570	110	<1400	1400	3853498
2-Propanone	ppbv	<420	420	110	<998	998	3853498
Methyl Ethyl Ketone (2-Butanone)	ppbv	<570	570	110	<1680	1680	3853498
Methyl Isobutyl Ketone	ppbv	<610	610	130	<2490	2490	3853498
Methyl Butyl Ketone (2-Hexanone)	ppbv	<380	380	76	<1560	1560	3853498
Methyl t-butyl ether (MTBE)	ppbv	<38	38	19	<137	137	3853498
Ethyl Acetate	ppbv	<420	420	95	<1510	1510	3853498
1,1-Dichloroethylene	ppbv	<48	48	19	<188	188	3853498
cis-1,2-Dichloroethylene	ppbv	674	36	19	2670	143	3853498
trans-1,2-Dichloroethylene	ppbv	<38	38	19	<151	151	3853498
Methylene Chloride(Dichloromethane)	ppbv	<450	450	56	<1560	1560	3853498
Chloroform	ppbv	<29	29	19	<139	139	3853498
Carbon Tetrachloride	ppbv	<57	57	19	<359	359	3853498
1,1-Dichloroethane	ppbv	230	38	19	933	154	3853498
1,2-Dichloroethane	ppbv	<38	38	19	<154	154	3853498
Ethylene Dibromide	ppbv	<32	32	19	<248	248	3853498
1,1,1-Trichloroethane	ppbv	<57	57	19	<311	311	3853498
1,1,2-Trichloroethane	ppbv	<29	29	19	<155	155	3853498
1,1,2,2-Tetrachloroethane	ppbv	<38	38	19	<261	261	3853498
cis-1,3-Dichloropropene	ppbv	<34	34	19	<155	155	3853498
trans-1,3-Dichloropropene	ppbv	<32	32	19	<147	147	3853498

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam Job #: B4N0852
Report Date: 2015/01/20

CEM Services Inc
Client Project #: L&RR LANDFILL

Your P.O. #: 074229

VOLATILE ORGANICS BY GC/MS (AIR)

Maxxam ID		YT1483					
Sampling Date		2014/12/03					
COC Number		065734					
	Units	**L&RR TO-15-3 INLET**	**RDL**	**MDL**	**ug/m3**	**DL (ug/m3)**	**QC Batch**
1,2-Dichloropropane	ppbv	<76	76	19	<351	351	3853498
Bromomethane	ppbv	<34	34	19	<133	133	3853498
Bromoform	ppbv	<38	38	19	<393	393	3853498
Bromodichloromethane	ppbv	<38	38	19	<255	255	3853498
Dibromochloromethane	ppbv	<38	38	19	<324	324	3853498
Trichloroethylene	ppbv	89	57	19	476	306	3853498
Tetrachloroethylene	ppbv	110	38	19	748	258	3853498
Benzene	ppbv	2800	34	19	8940	109	3853498
Toluene	ppbv	35300	76	38	133000	286	3853498
Ethylbenzene	ppbv	9610	38	19	41700	165	3853498
p+m-Xylene	ppbv	16600	70	19	72100	305	3853498
o-Xylene	ppbv	4030	38	19	17500	165	3853498
Styrene	ppbv	121	38	19	514	162	3853498
4-ethyltoluene	ppbv	517	420	95	2540	2050	3853498
1,3,5-Trimethylbenzene	ppbv	650	95	19	3200	467	3853498
1,2,4-Trimethylbenzene	ppbv	1270	95	19	6260	467	3853498
Chlorobenzene	ppbv	344	38	19	1590	175	3853498
Benzyl chloride	ppbv	<190	190	38	<984	984	3853498
1,3-Dichlorobenzene	ppbv	<76	76	19	<457	457	3853498
1,4-Dichlorobenzene	ppbv	238	76	19	1430	457	3853498
1,2-Dichlorobenzene	ppbv	<76	76	19	<457	457	3853498
1,2,4-Trichlorobenzene	ppbv	<380	380	76	<2820	2820	3853498
Hexachlorobutadiene	ppbv	<570	570	110	<6080	6080	3853498
Hexane	ppbv	2600	57	19	9180	201	3853498
Heptane	ppbv	1390	57	19	5710	234	3853498
Cyclohexane	ppbv	1200	38	19	4150	131	3853498
Tetrahydrofuran	ppbv	<76	76	19	<224	224	3853498
1,4-Dioxane	ppbv	<380	380	76	<1370	1370	3853498
Total Xylenes	ppbv	20600	110	18	89600	495	3853498
Vinyl Bromide	ppbv	<38	38	19	<166	166	3853498
Propene	ppbv	5400	57	19	9300	98.1	3853498
2,2,4-Trimethylpentane	ppbv	103	38	19	480	178	3853498

QC Batch = Quality Control Batch

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Maxxam Job #: B4N0852
Report Date: 2015/01/20

CEM Services Inc
Client Project #: L&RR LANDFILL

Your P.O. #: 074229

VOLATILE ORGANICS BY GC/MS (AIR)

Maxxam ID		YT1483					
Sampling Date		2014/12/03					
COC Number		065734					
	Units	**L&RR TO-15-3 INLET**	**RDL**	**MDL**	**ug/m3**	**DL (ug/m3)**	**QC Batch**
Carbon Disulfide	ppbv	<95	95	19	<296	296	3853498
Vinyl Acetate	ppbv	<38	38	19	<134	134	3853498
Surrogate Recovery (%)							
Bromochloromethane	%	78			N/A	N/A	3853498
D5-Chlorobenzene	%	75			N/A	N/A	3853498
Difluorobenzene	%	82			N/A	N/A	3853498

N/A = Not Applicable
QC Batch = Quality Control Batch

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Maxxam Job #: B4N0852
Report Date: 2015/01/20

CEM Services Inc
Client Project #: L&RR LANDFILL

Your P.O. #: 074229

VOLATILE ORGANICS BY GC/MS (AIR)

Maxxam ID		YT1484					
Sampling Date		2014/12/03					
COC Number		065734					
	Units	L&RR TO-15-1 OUTLET	RDL	MDL	ug/m3	DL (ug/m3)	QC Batch
Volatile Organics							
Dichlorodifluoromethane (FREON 12)	ppbv	<3.6	3.6	1.8	<17.8	17.8	3853498
1,2-Dichlorotetrafluoroethane	ppbv	3.1	3.1	1.8	22.0	21.4	3853498
Chloromethane	ppbv	7.6	5.4	1.8	15.7	11.2	3853498
Vinyl Chloride	ppbv	17.6	3.2	1.8	45.1	8.28	3853498
Chloroethane	ppbv	<5.4	5.4	1.8	<14.2	14.2	3853498
1,3-Butadiene	ppbv	23.9	9.0	1.8	52.8	19.9	3853498
Trichlorofluoromethane (FREON 11)	ppbv	<3.6	3.6	1.8	<20.2	20.2	3853498
Ethanol (ethyl alcohol)	ppbv	<41	41	8.9	<78.0	78.0	3853498
Trichlorotrifluoroethane	ppbv	<2.7	2.7	1.8	<20.7	20.7	3853498
2-propanol	ppbv	<54	54	11	<133	133	3853498
2-Propanone	ppbv	1830	14	3.5	4360	34.2	3853498
Methyl Ethyl Ketone (2-Butanone)	ppbv	<54	54	11	<159	159	3853498
Methyl Isobutyl Ketone	ppbv	<58	58	13	<236	236	3853498
Methyl Butyl Ketone (2-Hexanone)	ppbv	<36	36	7.2	<147	147	3853498
Methyl t-butyl ether (MTBE)	ppbv	<3.6	3.6	1.8	<13.0	13.0	3853498
Ethyl Acetate	ppbv	<40	40	9.1	<143	143	3853498
1,1-Dichloroethylene	ppbv	<4.5	4.5	1.8	<17.8	17.8	3853498
cis-1,2-Dichloroethylene	ppbv	8.9	3.4	1.8	35.4	13.6	3853498
trans-1,2-Dichloroethylene	ppbv	<3.6	3.6	1.8	<14.3	14.3	3853498
Methylene Chloride(Dichloromethane)	ppbv	<25	25	3.1	<86.8	86.8	3853498
Chloroform	ppbv	3.5	2.7	1.8	17.3	13.2	3853498
Carbon Tetrachloride	ppbv	<5.4	5.4	1.8	<34.0	34.0	3853498
1,1-Dichloroethane	ppbv	<3.6	3.6	1.8	<14.6	14.6	3853498
1,2-Dichloroethane	ppbv	<3.6	3.6	1.8	<14.6	14.6	3853498
Ethylene Dibromide	ppbv	<3.1	3.1	1.8	<23.5	23.5	3853498
1,1,1-Trichloroethane	ppbv	<5.4	5.4	1.8	<29.5	29.5	3853498
1,1,2-Trichloroethane	ppbv	<2.7	2.7	1.8	<14.7	14.7	3853498
1,1,2,2-Tetrachloroethane	ppbv	<3.6	3.6	1.8	<24.7	24.7	3853498
cis-1,3-Dichloropropene	ppbv	<3.2	3.2	1.8	<14.7	14.7	3853498
trans-1,3-Dichloropropene	ppbv	<3.1	3.1	1.8	<13.9	13.9	3853498

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam Job #: B4N0852
Report Date: 2015/01/20

CEM Services Inc
Client Project #: L&RR LANDFILL

Your P.O. #: 074229

VOLATILE ORGANICS BY GC/MS (AIR)

Maxxam ID		YT1484					
Sampling Date		2014/12/03					
COC Number		065734					
	Units	**L&RR TO-15-1 OUTLET**	**RDL**	**MDL**	**ug/m3**	**DL (ug/m3)**	**QC Batch**
1,2-Dichloropropane	ppbv	<7.2	7.2	1.8	<33.3	33.3	3853498
Bromomethane	ppbv	<3.2	3.2	1.8	<12.6	12.6	3853498
Bromoform	ppbv	<3.6	3.6	1.8	<37.2	37.2	3853498
Bromodichloromethane	ppbv	<3.6	3.6	1.8	<24.1	24.1	3853498
Dibromochloromethane	ppbv	<3.6	3.6	1.8	<30.7	30.7	3853498
Trichloroethylene	ppbv	<5.4	5.4	1.8	<29.0	29.0	3853498
Tetrachloroethylene	ppbv	<3.6	3.6	1.8	<24.4	24.4	3853498
Benzene	ppbv	103	3.2	1.8	329	10.4	3853498
Toluene	ppbv	1570	3.6	1.8	5900	13.5	3853498
Ethylbenzene	ppbv	87.4	3.6	1.8	380	15.6	3853498
p+m-Xylene	ppbv	107	6.7	1.8	466	28.9	3853498
o-Xylene	ppbv	26.2	3.6	1.8	114	15.6	3853498
Styrene	ppbv	5.2	3.6	1.8	22.2	15.3	3853498
4-ethyltoluene	ppbv	<40	40	9.1	<195	195	3853498
1,3,5-Trimethylbenzene	ppbv	<9.0	9.0	1.8	<44.2	44.2	3853498
1,2,4-Trimethylbenzene	ppbv	<9.0	9.0	1.8	<44.2	44.2	3853498
Chlorobenzene	ppbv	5.3	3.6	1.8	24.5	16.6	3853498
Benzyl chloride	ppbv	<18	18	3.6	<93.2	93.2	3853498
1,3-Dichlorobenzene	ppbv	<7.2	7.2	1.8	<43.3	43.3	3853498
1,4-Dichlorobenzene	ppbv	<7.2	7.2	1.8	<43.3	43.3	3853498
1,2-Dichlorobenzene	ppbv	<7.2	7.2	1.8	<43.3	43.3	3853498
1,2,4-Trichlorobenzene	ppbv	<36	36	7.2	<267	267	3853498
Hexachlorobutadiene	ppbv	<54	54	11	<576	576	3853498
Hexane	ppbv	53.3	5.4	1.8	188	19.0	3853498
Heptane	ppbv	14.5	5.4	1.8	59.3	22.1	3853498
Cyclohexane	ppbv	14.4	3.6	1.8	49.6	12.4	3853498
Tetrahydrofuran	ppbv	<7.2	7.2	1.8	<21.2	21.2	3853498
1,4-Dioxane	ppbv	<36	36	7.2	<130	130	3853498
Total Xylenes	ppbv	134	11	1.8	580	46.9	3853498
Vinyl Bromide	ppbv	<3.6	3.6	1.8	<15.7	15.7	3853498
Propene	ppbv	435	5.4	1.8	749	9.29	3853498
2,2,4-Trimethylpentane	ppbv	<3.6	3.6	1.8	<16.8	16.8	3853498

QC Batch = Quality Control Batch

Maxxam Job #: B4N0852
Report Date: 2015/01/20

CEM Services Inc
Client Project #: L&RR LANDFILL

Your P.O. #: 074229

VOLATILE ORGANICS BY GC/MS (AIR)

Maxxam ID		YT1484					
Sampling Date		2014/12/03					
COC Number		065734					
	Units	**L&RR TO-15-1 OUTLET**	**RDL**	**MDL**	**ug/m3**	**DL (ug/m3)**	**QC Batch**
Carbon Disulfide	ppbv	<9.0	9.0	1.8	<28.0	28.0	3853498
Vinyl Acetate	ppbv	<3.6	3.6	1.8	<12.7	12.7	3853498
Surrogate Recovery (%)							
Bromochloromethane	%	84			N/A	N/A	3853498
D5-Chlorobenzene	%	79			N/A	N/A	3853498
Difluorobenzene	%	85			N/A	N/A	3853498

N/A = Not Applicable
QC Batch = Quality Control Batch

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Maxxam Job #: B4N0852
Report Date: 2015/01/20

CEM Services Inc
Client Project #: L&RR LANDFILL

Your P.O. #: 074229

VOLATILE ORGANICS BY GC/MS (AIR)

Maxxam ID		YT1485					
Sampling Date		2014/12/03					
COC Number		065734					
	Units	**L&RR TO-15-2 OUTLET**	**RDL**	**MDL**	**ug/m3**	**DL (ug/m3)**	**QC Batch**
Volatile Organics							
Dichlorodifluoromethane (FREON 12)	ppbv	<3.8	3.8	1.9	<18.8	18.8	3853498
1,2-Dichlorotetrafluoroethane	ppbv	3.3	3.2	1.9	22.9	22.6	3853498
Chloromethane	ppbv	6.2	5.7	1.9	12.7	11.8	3853498
Vinyl Chloride	ppbv	20.1	3.4	1.9	51.3	8.74	3853498
Chloroethane	ppbv	<5.7	5.7	1.9	<15.0	15.0	3853498
1,3-Butadiene	ppbv	20.2	9.5	1.9	44.7	21.0	3853498
Trichlorofluoromethane (FREON 11)	ppbv	<3.8	3.8	1.9	<21.3	21.3	3853498
Ethanol (ethyl alcohol)	ppbv	<52	52	11	<98.0	98.0	3853498
Trichlorotrifluoroethane	ppbv	<2.9	2.9	1.9	<21.8	21.8	3853498
2-propanol	ppbv	<57	57	11	<140	140	3853498
2-Propanone	ppbv	344	15	3.8	817	36.1	3853498
Methyl Ethyl Ketone (2-Butanone)	ppbv	<57	57	11	<168	168	3853498
Methyl Isobutyl Ketone	ppbv	<61	61	13	<249	249	3853498
Methyl Butyl Ketone (2-Hexanone)	ppbv	<38	38	7.6	<156	156	3853498
Methyl t-butyl ether (MTBE)	ppbv	<3.8	3.8	1.9	<13.7	13.7	3853498
Ethyl Acetate	ppbv	<42	42	9.5	<151	151	3853498
1,1-Dichloroethylene	ppbv	<4.8	4.8	1.9	<18.8	18.8	3853498
cis-1,2-Dichloroethylene	ppbv	9.8	3.6	1.9	39.0	14.3	3853498
trans-1,2-Dichloroethylene	ppbv	<3.8	3.8	1.9	<15.1	15.1	3853498
Methylene Chloride(Dichloromethane)	ppbv	<35	35	4.4	<122	122	3853498
Chloroform	ppbv	3.9	2.9	1.9	19.2	13.9	3853498
Carbon Tetrachloride	ppbv	<5.7	5.7	1.9	<35.9	35.9	3853498
1,1-Dichloroethane	ppbv	<3.8	3.8	1.9	<15.4	15.4	3853498
1,2-Dichloroethane	ppbv	<3.8	3.8	1.9	<15.4	15.4	3853498
Ethylene Dibromide	ppbv	<3.2	3.2	1.9	<24.8	24.8	3853498
1,1,1-Trichloroethane	ppbv	<5.7	5.7	1.9	<31.1	31.1	3853498
1,1,2-Trichloroethane	ppbv	<2.9	2.9	1.9	<15.5	15.5	3853498
1,1,2,2-Tetrachloroethane	ppbv	<3.8	3.8	1.9	<26.1	26.1	3853498
cis-1,3-Dichloropropene	ppbv	<3.4	3.4	1.9	<15.5	15.5	3853498
trans-1,3-Dichloropropene	ppbv	<3.2	3.2	1.9	<14.7	14.7	3853498

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam Job #: B4N0852
Report Date: 2015/01/20

CEM Services Inc
Client Project #: L&RR LANDFILL

Your P.O. #: 074229

VOLATILE ORGANICS BY GC/MS (AIR)

Maxxam ID		YT1485					
Sampling Date		2014/12/03					
COC Number		065734					
	Units	**L&RR TO-15-2 OUTLET**	**RDL**	**MDL**	**ug/m3**	**DL (ug/m3)**	**QC Batch**
1,2-Dichloropropane	ppbv	<7.6	7.6	1.9	<35.1	35.1	3853498
Bromomethane	ppbv	<3.4	3.4	1.9	<13.3	13.3	3853498
Bromoform	ppbv	<3.8	3.8	1.9	<39.3	39.3	3853498
Bromodichloromethane	ppbv	<3.8	3.8	1.9	<25.5	25.5	3853498
Dibromochloromethane	ppbv	<3.8	3.8	1.9	<32.4	32.4	3853498
Trichloroethylene	ppbv	<5.7	5.7	1.9	<30.6	30.6	3853498
Tetrachloroethylene	ppbv	<3.8	3.8	1.9	<25.8	25.8	3853498
Benzene	ppbv	113	3.4	1.9	361	10.9	3853498
Toluene	ppbv	1420	3.8	1.9	5360	14.3	3853498
Ethylbenzene	ppbv	59.2	3.8	1.9	257	16.5	3853498
p+m-Xylene	ppbv	65.3	7.0	1.9	284	30.5	3853498
o-Xylene	ppbv	17.7	3.8	1.9	76.9	16.5	3853498
Styrene	ppbv	4.1	3.8	1.9	17.3	16.2	3853498
4-ethyltoluene	ppbv	<42	42	9.5	<205	205	3853498
1,3,5-Trimethylbenzene	ppbv	<9.5	9.5	1.9	<46.7	46.7	3853498
1,2,4-Trimethylbenzene	ppbv	<9.5	9.5	1.9	<46.7	46.7	3853498
Chlorobenzene	ppbv	6.0	3.8	1.9	27.8	17.5	3853498
Benzyl chloride	ppbv	<19	19	3.8	<98.4	98.4	3853498
1,3-Dichlorobenzene	ppbv	<7.6	7.6	1.9	<45.7	45.7	3853498
1,4-Dichlorobenzene	ppbv	<7.6	7.6	1.9	<45.7	45.7	3853498
1,2-Dichlorobenzene	ppbv	<7.6	7.6	1.9	<45.7	45.7	3853498
1,2,4-Trichlorobenzene	ppbv	<38	38	7.6	<282	282	3853498
Hexachlorobutadiene	ppbv	<57	57	11	<608	608	3853498
Hexane	ppbv	66.0	5.7	1.9	233	20.1	3853498
Heptane	ppbv	14.9	5.7	1.9	60.9	23.4	3853498
Cyclohexane	ppbv	13.5	3.8	1.9	46.4	13.1	3853498
Tetrahydrofuran	ppbv	<7.6	7.6	1.9	<22.4	22.4	3853498
1,4-Dioxane	ppbv	<38	38	7.6	<137	137	3853498
Total Xylenes	ppbv	83	11	1.8	360	49.5	3853498
Vinyl Bromide	ppbv	<3.8	3.8	1.9	<16.6	16.6	3853498
Propene	ppbv	441	5.7	1.9	759	9.81	3853498
2,2,4-Trimethylpentane	ppbv	<3.8	3.8	1.9	<17.8	17.8	3853498

QC Batch = Quality Control Batch

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Maxxam Job #: B4N0852
Report Date: 2015/01/20

CEM Services Inc
Client Project #: L&RR LANDFILL

Your P.O. #: 074229

VOLATILE ORGANICS BY GC/MS (AIR)

Maxxam ID		YT1485					
Sampling Date		2014/12/03					
COC Number		065734					
	Units	**L&RR TO-15-2 OUTLET**	**RDL**	**MDL**	**ug/m3**	**DL (ug/m3)**	**QC Batch**
Carbon Disulfide	ppbv	<9.5	9.5	1.9	<29.6	29.6	3853498
Vinyl Acetate	ppbv	<3.8	3.8	1.9	<13.4	13.4	3853498
Surrogate Recovery (%)							
Bromochloromethane	%	78			N/A	N/A	3853498
D5-Chlorobenzene	%	75			N/A	N/A	3853498
Difluorobenzene	%	81			N/A	N/A	3853498

N/A = Not Applicable
QC Batch = Quality Control Batch

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Maxxam Job #: B4N0852
Report Date: 2015/01/20

CEM Services Inc
Client Project #: L&RR LANDFILL

Your P.O. #: 074229

VOLATILE ORGANICS BY GC/MS (AIR)

Maxxam ID		YT1486					
Sampling Date		2014/12/03					
COC Number		065734					
	Units	**L&RR TO-15-3 OUTLET**	**RDL**	**MDL**	**ug/m3**	**DL (ug/m3)**	**QC Batch**
Volatile Organics							
Dichlorodifluoromethane (FREON 12)	ppbv	3.43	0.20	0.10	17.0	0.989	3853498
1,2-Dichlorotetrafluoroethane	ppbv	3.46	0.17	0.10	24.2	1.19	3853498
Chloromethane	ppbv	4.12	0.30	0.10	8.52	0.620	3853498
Vinyl Chloride	ppbv	23.7	0.18	0.10	60.7	0.460	3853498
Chloroethane	ppbv	0.46	0.30	0.10	1.20	0.792	3853498
1,3-Butadiene	ppbv	17.5	0.50	0.10	38.8	1.11	3853498
Trichlorofluoromethane (FREON 11)	ppbv	0.22	0.20	0.10	1.24	1.12	3853498
Ethanol (ethyl alcohol)	ppbv	<2.3	2.3	0.50	<4.33	4.33	3853498
Trichlorotrifluoroethane	ppbv	0.16	0.15	0.10	1.22	1.15	3853498
2-propanol	ppbv	<3.0	3.0	0.60	<7.37	7.37	3853498
2-Propanone	ppbv	43.5	0.80	0.20	103	1.90	3853498
Methyl Ethyl Ketone (2-Butanone)	ppbv	<3.0	3.0	0.60	<8.85	8.85	3853498
Methyl Isobutyl Ketone	ppbv	<3.2	3.2	0.70	<13.1	13.1	3853498
Methyl Butyl Ketone (2-Hexanone)	ppbv	<2.0	2.0	0.40	<8.19	8.19	3853498
Methyl t-butyl ether (MTBE)	ppbv	<0.20	0.20	0.10	<0.721	0.721	3853498
Ethyl Acetate	ppbv	<2.2	2.2	0.50	<7.93	7.93	3853498
1,1-Dichloroethylene	ppbv	0.45	0.25	0.10	1.77	0.991	3853498
cis-1,2-Dichloroethylene	ppbv	13.3	0.19	0.10	52.8	0.753	3853498
trans-1,2-Dichloroethylene	ppbv	1.85	0.20	0.10	7.35	0.793	3853498
Methylene Chloride(Dichloromethane)	ppbv	3.54	0.80	0.10	12.3	2.78	3853498
Chloroform	ppbv	<0.15	0.15	0.10	<0.732	0.732	3853498
Carbon Tetrachloride	ppbv	<0.30	0.30	0.10	<1.89	1.89	3853498
1,1-Dichloroethane	ppbv	<0.20	0.20	0.10	<0.809	0.809	3853498
1,2-Dichloroethane	ppbv	<0.20	0.20	0.10	<0.809	0.809	3853498
Ethylene Dibromide	ppbv	<0.17	0.17	0.10	<1.31	1.31	3853498
1,1,1-Trichloroethane	ppbv	<0.30	0.30	0.10	<1.64	1.64	3853498
1,1,2-Trichloroethane	ppbv	<0.15	0.15	0.10	<0.818	0.818	3853498
1,1,2,2-Tetrachloroethane	ppbv	<0.20	0.20	0.10	<1.37	1.37	3853498
cis-1,3-Dichloropropene	ppbv	<0.18	0.18	0.10	<0.817	0.817	3853498
trans-1,3-Dichloropropene	ppbv	<0.17	0.17	0.10	<0.772	0.772	3853498

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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Maxxam Job #: B4N0852
Report Date: 2015/01/20

CEM Services Inc
Client Project #: L&RR LANDFILL

Your P.O. #: 074229

VOLATILE ORGANICS BY GC/MS (AIR)

Maxxam ID		YT1486					
Sampling Date		2014/12/03					
COC Number		065734					
	Units	**L&RR TO-15-3 OUTLET**	**RDL**	**MDL**	**ug/m3**	**DL (ug/m3)**	**QC Batch**
1,2-Dichloropropane	ppbv	<0.40	0.40	0.10	<1.85	1.85	3853498
Bromomethane	ppbv	<0.18	0.18	0.10	<0.699	0.699	3853498
Bromoform	ppbv	<0.20	0.20	0.10	<2.07	2.07	3853498
Bromodichloromethane	ppbv	<0.20	0.20	0.10	<1.34	1.34	3853498
Dibromochloromethane	ppbv	<0.20	0.20	0.10	<1.70	1.70	3853498
Trichloroethylene	ppbv	2.03	0.30	0.10	10.9	1.61	3853498
Tetrachloroethylene	ppbv	2.97	0.20	0.10	20.1	1.36	3853498
Benzene	ppbv	164	0.99	0.55	523	3.16	3853498
Toluene	ppbv	550	1.1	0.55	2070	4.14	3853498
Ethylbenzene	ppbv	89.3	0.20	0.10	388	0.868	3853498
p+m-Xylene	ppbv	88.5	0.37	0.10	384	1.61	3853498
o-Xylene	ppbv	23.2	0.20	0.10	101	0.868	3853498
Styrene	ppbv	8.60	0.20	0.10	36.6	0.852	3853498
4-ethyltoluene	ppbv	<2.2	2.2	0.50	<10.8	10.8	3853498
1,3,5-Trimethylbenzene	ppbv	1.13	0.50	0.10	5.53	2.46	3853498
1,2,4-Trimethylbenzene	ppbv	0.70	0.50	0.10	3.42	2.46	3853498
Chlorobenzene	ppbv	10.2	0.20	0.10	46.9	0.921	3853498
Benzyl chloride	ppbv	<1.0	1.0	0.20	<5.18	5.18	3853498
1,3-Dichlorobenzene	ppbv	<0.40	0.40	0.10	<2.40	2.40	3853498
1,4-Dichlorobenzene	ppbv	10.5	0.40	0.10	63.4	2.40	3853498
1,2-Dichlorobenzene	ppbv	1.14	0.40	0.10	6.88	2.40	3853498
1,2,4-Trichlorobenzene	ppbv	<2.0	2.0	0.40	<14.8	14.8	3853498
Hexachlorobutadiene	ppbv	<3.0	3.0	0.60	<32.0	32.0	3853498
Hexane	ppbv	33.0	0.30	0.10	116	1.06	3853498
Heptane	ppbv	18.9	0.30	0.10	77.4	1.23	3853498
Cyclohexane	ppbv	14.9	0.20	0.10	51.3	0.688	3853498
Tetrahydrofuran	ppbv	<0.40	0.40	0.10	<1.18	1.18	3853498
1,4-Dioxane	ppbv	<2.0	2.0	0.40	<7.21	7.21	3853498
Total Xylenes	ppbv	112	0.60	0.10	485	2.61	3853498
Vinyl Bromide	ppbv	<0.20	0.20	0.10	<0.875	0.875	3853498
Propene	ppbv	645	1.7	0.57	1110	2.84	3853498
2,2,4-Trimethylpentane	ppbv	1.47	0.20	0.10	6.89	0.934	3853498

QC Batch = Quality Control Batch

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Maxxam Job #: B4N0852
Report Date: 2015/01/20

CEM Services Inc
Client Project #: L&RR LANDFILL

Your P.O. #: 074229

VOLATILE ORGANICS BY GC/MS (AIR)

Maxxam ID		YT1486					
Sampling Date		2014/12/03					
COC Number		065734					
	Units	**L&RR TO-15-3 OUTLET**	**RDL**	**MDL**	**ug/m3**	**DL (ug/m3)**	**QC Batch**
Carbon Disulfide	ppbv	0.96	0.50	0.10	2.99	1.56	3853498
Vinyl Acetate	ppbv	<0.20	0.20	0.10	<0.704	0.704	3853498
Surrogate Recovery (%)							
Bromochloromethane	%	83			N/A	N/A	3853498
D5-Chlorobenzene	%	77			N/A	N/A	3853498
Difluorobenzene	%	84			N/A	N/A	3853498

N/A = Not Applicable
QC Batch = Quality Control Batch

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Maxxam Job #: B4N0852
Report Date: 2015/01/20

CEM Services Inc
Client Project #: L&RR LANDFILL

Your P.O. #: 074229

Test Summary

Maxxam ID YT1481 **Collected** 2014/12/03
Sample ID L&RR TO-15-1 INLET **Shipped**
Matrix AIR **Received** 2014/12/05

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Canister Pressure (TO-15)	PRES	3853092	N/A	2014/12/08	Yao Liang Sun
Volatile Organics in Air (TO-15)	GC/MS	3853498	N/A	2014/12/08	Yao Liang Sun

Maxxam ID YT1482 **Collected** 2014/12/03
Sample ID L&RR TO-15-2 INLET **Shipped**
Matrix AIR **Received** 2014/12/05

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Canister Pressure (TO-15)	PRES	3853092	N/A	2014/12/08	Yao Liang Sun
Volatile Organics in Air (TO-15)	GC/MS	3853498	N/A	2014/12/08	Yao Liang Sun

Maxxam ID YT1483 **Collected** 2014/12/03
Sample ID L&RR TO-15-3 INLET **Shipped**
Matrix AIR **Received** 2014/12/05

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Canister Pressure (TO-15)	PRES	3853092	N/A	2014/12/08	Yao Liang Sun
Volatile Organics in Air (TO-15)	GC/MS	3853498	N/A	2014/12/08	Yao Liang Sun

Maxxam ID YT1484 **Collected** 2014/12/03
Sample ID L&RR TO-15-1 OUTLET **Shipped**
Matrix AIR **Received** 2014/12/05

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Canister Pressure (TO-15)	PRES	3853092	N/A	2014/12/08	Yao Liang Sun
Volatile Organics in Air (TO-15)	GC/MS	3853498	N/A	2014/12/08	Yao Liang Sun

Maxxam ID YT1485 **Collected** 2014/12/03
Sample ID L&RR TO-15-2 OUTLET **Shipped**
Matrix AIR **Received** 2014/12/05

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Canister Pressure (TO-15)	PRES	3853092	N/A	2014/12/08	Yao Liang Sun
Volatile Organics in Air (TO-15)	GC/MS	3853498	N/A	2014/12/08	Yao Liang Sun

Maxxam ID YT1486 **Collected** 2014/12/03
Sample ID L&RR TO-15-3 OUTLET **Shipped**
Matrix AIR **Received** 2014/12/05

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Canister Pressure (TO-15)	PRES	3853092	N/A	2014/12/08	Yao Liang Sun
Volatile Organics in Air (TO-15)	GC/MS	3853498	N/A	2014/12/08	Yao Liang Sun

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Maxxam Job #: B4N0852
Report Date: 2015/01/20

CEM Services Inc
Client Project #: L&RR LANDFILL

Your P.O. #: 074229

Test Summary

Maxxam ID YT1488 **Collected** 2014/12/03
Sample ID L&RR TO15-1 INLET **Shipped**
Matrix Water **Received** 2014/12/05

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
Data Package - Level 3 Volatiles		3853119	N/A	2014/12/09	Edwin Ayala
VOST Condensate (8260Cmod)	P&T/MS	3852937	N/A	2014/12/09	Edwin Ayala

Maxxam ID YT1489 **Collected** 2014/12/03
Sample ID L&RR TO15-2 INLET **Shipped**
Matrix Water **Received** 2014/12/05

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
VOST Condensate (8260Cmod)	P&T/MS	3852937	N/A	2014/12/09	Edwin Ayala

Maxxam ID YT1490 **Collected** 2014/12/03
Sample ID L&RR TO15-3 INLET **Shipped**
Matrix Water **Received** 2014/12/05

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
VOST Condensate (8260Cmod)	P&T/MS	3852937	N/A	2014/12/09	Edwin Ayala

Maxxam ID YT1491 **Collected** 2014/12/03
Sample ID L&RR TO15-1 OUTLET **Shipped**
Matrix Water **Received** 2014/12/05

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
VOST Condensate (8260Cmod)	P&T/MS	3852937	N/A	2014/12/09	Edwin Ayala

Maxxam ID YT1492 **Collected** 2014/12/03
Sample ID L&RR TO15-2 OUTLET **Shipped**
Matrix Water **Received** 2014/12/05

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
VOST Condensate (8260Cmod)	P&T/MS	3852937	N/A	2014/12/09	Edwin Ayala

Maxxam ID YT1493 **Collected** 2014/12/03
Sample ID L&RR TO15-3 OUTLET **Shipped**
Matrix Water **Received** 2014/12/05

Test Description	Instrumentation	Batch	Extracted	Analyzed	Analyst
VOST Condensate (8260Cmod)	P&T/MS	3852937	N/A	2014/12/09	Edwin Ayala

Maxxam Analytics International Corporation o/a Maxxam Analytics 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.maxxam.ca

Maxxam Job #: B4N0852
Report Date: 2015/01/20

CEM Services Inc
Client Project #: L&RR LANDFILL

Your P.O. #: 074229

GENERAL COMMENTS

VOC Analysis: The samples were received in non-standard VOC vials. The results may be biased low due to the presence of headspace upon sample receipt.

VOC Analysis: Due to high concentrations of target analytes, some samples required dilution. Detection limits were adjusted accordingly.

Sample YT1481-01: Sample was analyzed at a 190X dilution. Toluene was analyzed at a 380X dilution. The DL's were adjusted accordingly.

Increased DL for ethanol, acetone and dichloromethane due to possible background.

Propene is a mixture of both propene and propane and this represents the highest possible concentration of propene.

Sample YT1482-01: Sample was analyzed at a 180X dilution. Toluene was analyzed at a 360X dilution.The DL's were adjusted accordingly.

Increased DL for acetone and dichloromethane due to possible background.

Propene is a mixture of both propene and propane and this represents the highest possible concentration of propene.

Sample YT1483-01: Sample was analyzed at a 190X dilution. Toluene was analyzed at a 380X dilution. The DL's were adjusted accordingly.

Increased DL for acetone and dichloromethane due to possible background.

Propene is a mixture of both propene and propane and this represents the highest possible concentration of propene.

Sample YT1484-01: Sample was analyzed at a 18X dilution. The DL's were adjusted accordingly.

Increased DL for dichloromethane due to possible background.

Sample YT1485-01: Sample was analyzed at a 19X dilution. The DL's were adjusted accordingly.

Increased DL for ethanol and dichloromethane due to possible background.

Sample YT1486-01: Propene, benzene and toluene were analyzed at a 5.5X dilution. The DL's were adjusted accordingly.

Sample YT1492-01: VOC Analysis: Due to insufficient sample volume, sample required dilution. Detection limits were adjusted accordingly.

Sample YT1493-01: VOC Analysis: Due to insufficient sample volume, sample required dilution. Detection limits were adjusted accordingly.

Results relate only to the items tested.

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CEM Services Inc
Attention: Sean MacKay
Client Project #: L&RR LANDFILL
P.O. #: 074229
Site Location:

Quality Assurance Report

Maxxam Job Number: GB4N0852

QA/QC Batch Num Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	%Recovery	Units	QC Limits
3852937 EAY	Spiked Blank	4-Bromofluorobenzene	2014/12/09		99	%	70 - 130
		D4-1,2-Dichloroethane	2014/12/09		97	%	70 - 130
		D8-Toluene	2014/12/09		99	%	70 - 130
		Dichlorodifluoromethane (FREON 12)	2014/12/09		94	%	60 - 140
		Chloromethane	2014/12/09		82	%	60 - 140
		Vinyl Chloride	2014/12/09		89	%	70 - 130
		Bromomethane	2014/12/09		81	%	60 - 140
		Chloroethane	2014/12/09		89	%	70 - 130
		Trichlorofluoromethane (FREON 11)	2014/12/09		100	%	70 - 130
		Acetone (2-Propanone)	2014/12/09		96	%	60 - 140
		1,1-Dichloroethylene	2014/12/09		106	%	70 - 130
		Iodomethane	2014/12/09		113	%	N/A
		Carbon Disulfide	2014/12/09		108	%	N/A
		Methylene Chloride(Dichloromethane)	2014/12/09		98	%	70 - 130
		1,1-Dichloroethane	2014/12/09		100	%	70 - 130
		trans-1,2-Dichloroethylene	2014/12/09		100	%	70 - 130
		cis-1,2-Dichloroethylene	2014/12/09		99	%	70 - 130
		Chloroform	2014/12/09		101	%	70 - 130
		1,2-Dichloroethane	2014/12/09		96	%	70 - 130
		Methyl Ethyl Ketone (2-Butanone)	2014/12/09		100	%	60 - 140
		1,1,1-Trichloroethane	2014/12/09		100	%	70 - 130
		Carbon Tetrachloride	2014/12/09		100	%	70 - 130
		Benzene	2014/12/09		101	%	70 - 130
		1,1,2-Trichloroethane	2014/12/09		101	%	70 - 130
		1,2-Dichloropropane	2014/12/09		99	%	70 - 130
		Trichloroethylene	2014/12/09		101	%	70 - 130
		Dibromomethane	2014/12/09		115	%	N/A
		Bromodichloromethane	2014/12/09		96	%	70 - 130
		cis-1,3-Dichloropropene	2014/12/09		94	%	70 - 130
		trans-1,3-Dichloropropene	2014/12/09		94	%	70 - 130
		Dibromochloromethane	2014/12/09		102	%	70 - 130
		Methyl Isobutyl Ketone	2014/12/09		97	%	70 - 130
		Methyl Butyl Ketone (2-Hexanone)	2014/12/09		109	%	N/A
		Toluene	2014/12/09		94	%	70 - 130
		Ethylene Dibromide	2014/12/09		102	%	70 - 130
		Tetrachloroethylene	2014/12/09		100	%	70 - 130
		Chlorobenzene	2014/12/09		97	%	70 - 130
		1,1,1,2-Tetrachloroethane	2014/12/09		103	%	70 - 130
		Ethylbenzene	2014/12/09		91	%	70 - 130
		p+m-Xylene	2014/12/09		91	%	70 - 130
		Styrene	2014/12/09		96	%	70 - 130
		o-Xylene	2014/12/09		90	%	70 - 130
		Bromoform	2014/12/09		101	%	70 - 130
		1,1,2,2-Tetrachloroethane	2014/12/09		101	%	70 - 130
		1,2,3-Trichloropropane	2014/12/09		113	%	N/A
		1,3-Dichlorobenzene	2014/12/09		98	%	70 - 130
		1,4-Dichlorobenzene	2014/12/09		97	%	70 - 130
		1,2-Dichlorobenzene	2014/12/09		96	%	70 - 130
	Method Blank	4-Bromofluorobenzene	2014/12/09		96	%	70 - 130
		D4-1,2-Dichloroethane	2014/12/09		102	%	70 - 130
		D8-Toluene	2014/12/09		97	%	70 - 130
		Dichlorodifluoromethane (FREON 12)	2014/12/09	<1.0		ug/L	
		Chloromethane	2014/12/09	<2.0		ug/L	
		Vinyl Chloride	2014/12/09	<0.40		ug/L	
		Bromomethane	2014/12/09	<3.0		ug/L	

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Quality Assurance Report (Continued)

Maxxam Job Number: GB4N0852

QA/QC Batch Num Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	%Recovery	Units	QC Limits
3852937 EAY	Method Blank	Chloroethane	2014/12/09	<1.0		ug/L	
		Trichlorofluoromethane (FREON 11)	2014/12/09	<2.0		ug/L	
		Acetone (2-Propanone)	2014/12/09	<15		ug/L	
		1,1-Dichloroethylene	2014/12/09	<0.50		ug/L	
		Iodomethane	2014/12/09	<0.60		ug/L	
		Carbon Disulfide	2014/12/09	<0.50		ug/L	
		Methylene Chloride(Dichloromethane)	2014/12/09	<1.0		ug/L	
		1,1-Dichloroethane	2014/12/09	<0.40		ug/L	
		trans-1,2-Dichloroethylene	2014/12/09	<1.0		ug/L	
		cis-1,2-Dichloroethylene	2014/12/09	<1.0		ug/L	
		Chloroform	2014/12/09	<0.40		ug/L	
		1,2-Dichloroethane	2014/12/09	<0.50		ug/L	
		Methyl Ethyl Ketone (2-Butanone)	2014/12/09	<10		ug/L	
		1,1,1-Trichloroethane	2014/12/09	<0.50		ug/L	
		Carbon Tetrachloride	2014/12/09	<0.50		ug/L	
		Benzene	2014/12/09	<0.50		ug/L	
		1,1,2-Trichloroethane	2014/12/09	<0.50		ug/L	
		1,2-Dichloropropane	2014/12/09	<0.50		ug/L	
		Trichloroethylene	2014/12/09	<0.50		ug/L	
		Dibromomethane	2014/12/09	<0.50		ug/L	
		Bromodichloromethane	2014/12/09	<0.40		ug/L	
		cis-1,3-Dichloropropene	2014/12/09	<0.40		ug/L	
		trans-1,3-Dichloropropene	2014/12/09	<0.60		ug/L	
		Dibromochloromethane	2014/12/09	<0.40		ug/L	
		Methyl Isobutyl Ketone	2014/12/09	<10		ug/L	
		Methyl Butyl Ketone (2-Hexanone)	2014/12/09	<10		ug/L	
		Toluene	2014/12/09	<0.50		ug/L	
		Ethylene Dibromide	2014/12/09	<0.50		ug/L	
		Tetrachloroethylene	2014/12/09	<0.50		ug/L	
		Chlorobenzene	2014/12/09	<0.50		ug/L	
		1,1,1,2-Tetrachloroethane	2014/12/09	<0.50		ug/L	
		Ethylbenzene	2014/12/09	<0.50		ug/L	
		p+m-Xylene	2014/12/09	<0.50		ug/L	
		Styrene	2014/12/09	<0.50		ug/L	
		o-Xylene	2014/12/09	<0.50		ug/L	
		Bromoform	2014/12/09	<0.40		ug/L	
		1,1,2,2-Tetrachloroethane	2014/12/09	<1.0		ug/L	
		1,2,3-Trichloropropane	2014/12/09	<0.60		ug/L	
		1,3-Dichlorobenzene	2014/12/09	<0.50		ug/L	
		1,4-Dichlorobenzene	2014/12/09	<0.50		ug/L	
		1,2-Dichlorobenzene	2014/12/09	<0.50		ug/L	
3853498 LSY	Spiked Blank	Bromochloromethane	2014/12/08		98	%	60 - 140
		D5-Chlorobenzene	2014/12/08		99	%	60 - 140
		Difluorobenzene	2014/12/08		100	%	60 - 140
		Dichlorodifluoromethane (FREON 12)	2014/12/08		88	%	70 - 130
		1,2-Dichlorotetrafluoroethane	2014/12/08		88	%	70 - 130
		Chloromethane	2014/12/08		97	%	70 - 130
		Vinyl Chloride	2014/12/08		101	%	70 - 130
		Chloroethane	2014/12/08		98	%	70 - 130
		1,3-Butadiene	2014/12/08		103	%	70 - 130
		Trichlorofluoromethane (FREON 11)	2014/12/08		100	%	70 - 130
		Ethanol (ethyl alcohol)	2014/12/08		84	%	70 - 130
		Trichlorotrifluoroethane	2014/12/08		100	%	70 - 130
		2-propanol	2014/12/08		98	%	70 - 130
		2-Propanone	2014/12/08		100	%	70 - 130

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Quality Assurance Report (Continued)

Maxxam Job Number: GB4N0852

QA/QC Batch Num Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	%Recovery	Units	QC Limits
3853498 LSY	Spiked Blank	Methyl Ethyl Ketone (2-Butanone)	2014/12/08		107	%	70 - 130
		Methyl Isobutyl Ketone	2014/12/08		97	%	70 - 130
		Methyl Butyl Ketone (2-Hexanone)	2014/12/08		104	%	70 - 130
		Methyl t-butyl ether (MTBE)	2014/12/08		97	%	70 - 130
		Ethyl Acetate	2014/12/08		104	%	70 - 130
		1,1-Dichloroethylene	2014/12/08		100	%	70 - 130
		cis-1,2-Dichloroethylene	2014/12/08		102	%	70 - 130
		trans-1,2-Dichloroethylene	2014/12/08		106	%	70 - 130
		Methylene Chloride(Dichloromethane)	2014/12/08		100	%	70 - 130
		Chloroform	2014/12/08		105	%	70 - 130
		Carbon Tetrachloride	2014/12/08		99	%	70 - 130
		1,1-Dichloroethane	2014/12/08		93	%	70 - 130
		1,2-Dichloroethane	2014/12/08		98	%	70 - 130
		Ethylene Dibromide	2014/12/08		102	%	70 - 130
		1,1,1-Trichloroethane	2014/12/08		99	%	70 - 130
		1,1,2-Trichloroethane	2014/12/08		101	%	70 - 130
		1,1,2,2-Tetrachloroethane	2014/12/08		94	%	70 - 130
		cis-1,3-Dichloropropene	2014/12/08		110	%	70 - 130
		trans-1,3-Dichloropropene	2014/12/08		110	%	70 - 130
		1,2-Dichloropropane	2014/12/08		100	%	70 - 130
		Bromomethane	2014/12/08		99	%	70 - 130
		Bromoform	2014/12/08		102	%	70 - 130
		Bromodichloromethane	2014/12/08		103	%	70 - 130
		Dibromochloromethane	2014/12/08		105	%	70 - 130
		Trichloroethylene	2014/12/08		102	%	70 - 130
		Tetrachloroethylene	2014/12/08		97	%	70 - 130
		Benzene	2014/12/08		100	%	70 - 130
		Toluene	2014/12/08		104	%	70 - 130
		Ethylbenzene	2014/12/08		103	%	70 - 130
		p+m-Xylene	2014/12/08		101	%	70 - 130
		o-Xylene	2014/12/08		106	%	70 - 130
		Styrene	2014/12/08		104	%	70 - 130
		4-ethyltoluene	2014/12/08		104	%	70 - 130
		1,3,5-Trimethylbenzene	2014/12/08		100	%	70 - 130
		1,2,4-Trimethylbenzene	2014/12/08		106	%	70 - 130
		Chlorobenzene	2014/12/08		104	%	70 - 130
		Benzyl chloride	2014/12/08		109	%	70 - 130
		1,3-Dichlorobenzene	2014/12/08		108	%	70 - 130
		1,4-Dichlorobenzene	2014/12/08		114	%	70 - 130
		1,2-Dichlorobenzene	2014/12/08		102	%	70 - 130
		1,2,4-Trichlorobenzene	2014/12/08		130	%	70 - 130
		Hexachlorobutadiene	2014/12/08		97	%	70 - 130
		Hexane	2014/12/08		96	%	70 - 130
		Heptane	2014/12/08		100	%	70 - 130
		Cyclohexane	2014/12/08		97	%	70 - 130
		Tetrahydrofuran	2014/12/08		95	%	70 - 130
		1,4-Dioxane	2014/12/08		96	%	70 - 130
		Total Xylenes	2014/12/08		102	%	70 - 130
		Vinyl Bromide	2014/12/08		104	%	70 - 130
		Propene	2014/12/08		103	%	70 - 130
		2,2,4-Trimethylpentane	2014/12/08		100	%	70 - 130
		Carbon Disulfide	2014/12/08		106	%	70 - 130
		Vinyl Acetate	2014/12/08		97	%	70 - 130
	Method Blank	Bromochloromethane	2014/12/08		83	%	60 - 140
		D5-Chlorobenzene	2014/12/08		86	%	60 - 140

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CEM Services Inc
Attention: Sean MacKay
Client Project #: L&RR LANDFILL
P.O. #: 074229
Site Location:

Quality Assurance Report (Continued)

Maxxam Job Number: GB4N0852

QA/QC Batch Num Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	%Recovery	Units	QC Limits
3853498 LSY	Method Blank	Difluorobenzene	2014/12/08		90	%	60 - 140
		Dichlorodifluoromethane (FREON 12)	2014/12/08	<0.20		ppbv	
		1,2-Dichlorotetrafluoroethane	2014/12/08	<0.17		ppbv	
		Chloromethane	2014/12/08	<0.30		ppbv	
		Vinyl Chloride	2014/12/08	<0.18		ppbv	
		Chloroethane	2014/12/08	<0.30		ppbv	
		1,3-Butadiene	2014/12/08	<0.50		ppbv	
		Trichlorofluoromethane (FREON 11)	2014/12/08	<0.20		ppbv	
		Ethanol (ethyl alcohol)	2014/12/08	<2.3		ppbv	
		Trichlorotrifluoroethane	2014/12/08	<0.15		ppbv	
		2-propanol	2014/12/08	<3.0		ppbv	
		2-Propanone	2014/12/08	<0.80		ppbv	
		Methyl Ethyl Ketone (2-Butanone)	2014/12/08	<3.0		ppbv	
		Methyl Isobutyl Ketone	2014/12/08	<3.2		ppbv	
		Methyl Butyl Ketone (2-Hexanone)	2014/12/08	<2.0		ppbv	
		Methyl t-butyl ether (MTBE)	2014/12/08	<0.20		ppbv	
		Ethyl Acetate	2014/12/08	<2.2		ppbv	
		1,1-Dichloroethylene	2014/12/08	<0.25		ppbv	
		cis-1,2-Dichloroethylene	2014/12/08	<0.19		ppbv	
		trans-1,2-Dichloroethylene	2014/12/08	<0.20		ppbv	
		Methylene Chloride(Dichloromethane)	2014/12/08	<0.80		ppbv	
		Chloroform	2014/12/08	<0.15		ppbv	
		Carbon Tetrachloride	2014/12/08	<0.30		ppbv	
		1,1-Dichloroethane	2014/12/08	<0.20		ppbv	
		1,2-Dichloroethane	2014/12/08	<0.20		ppbv	
		Ethylene Dibromide	2014/12/08	<0.17		ppbv	
		1,1,1-Trichloroethane	2014/12/08	<0.30		ppbv	
		1,1,2-Trichloroethane	2014/12/08	<0.15		ppbv	
		1,1,2,2-Tetrachloroethane	2014/12/08	<0.20		ppbv	
		cis-1,3-Dichloropropene	2014/12/08	<0.18		ppbv	
		trans-1,3-Dichloropropene	2014/12/08	<0.17		ppbv	
		1,2-Dichloropropane	2014/12/08	<0.40		ppbv	
		Bromomethane	2014/12/08	<0.18		ppbv	
		Bromoform	2014/12/08	<0.20		ppbv	
		Bromodichloromethane	2014/12/08	<0.20		ppbv	
		Dibromochloromethane	2014/12/08	<0.20		ppbv	
		Trichloroethylene	2014/12/08	<0.30		ppbv	
		Tetrachloroethylene	2014/12/08	<0.20		ppbv	
		Benzene	2014/12/08	<0.18		ppbv	
		Toluene	2014/12/08	<0.20		ppbv	
		Ethylbenzene	2014/12/08	<0.20		ppbv	
		p+m-Xylene	2014/12/08	<0.37		ppbv	
		o-Xylene	2014/12/08	<0.20		ppbv	
		Styrene	2014/12/08	<0.20		ppbv	
		4-ethyltoluene	2014/12/08	<2.2		ppbv	
		1,3,5-Trimethylbenzene	2014/12/08	<0.50		ppbv	
		1,2,4-Trimethylbenzene	2014/12/08	<0.50		ppbv	
		Chlorobenzene	2014/12/08	<0.20		ppbv	
		Benzyl chloride	2014/12/08	<1.0		ppbv	
		1,3-Dichlorobenzene	2014/12/08	<0.40		ppbv	
		1,4-Dichlorobenzene	2014/12/08	<0.40		ppbv	
		1,2-Dichlorobenzene	2014/12/08	<0.40		ppbv	
		1,2,4-Trichlorobenzene	2014/12/08	<2.0		ppbv	
		Hexachlorobutadiene	2014/12/08	<3.0		ppbv	
		Hexane	2014/12/08	<0.30		ppbv	

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CEM Services Inc
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Quality Assurance Report (Continued)

Maxxam Job Number: GB4N0852

QA/QC Batch Num Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	%Recovery	Units	QC Limits
3853498 LSY	Method Blank	Heptane	2014/12/08	<0.30		ppbv	
		Cyclohexane	2014/12/08	<0.20		ppbv	
		Tetrahydrofuran	2014/12/08	<0.40		ppbv	
		1,4-Dioxane	2014/12/08	<2.0		ppbv	
		Total Xylenes	2014/12/08	<0.60		ppbv	
		Vinyl Bromide	2014/12/08	<0.20		ppbv	
		Propene	2014/12/08	<0.30		ppbv	
		2,2,4-Trimethylpentane	2014/12/08	<0.20		ppbv	
		Carbon Disulfide	2014/12/08	<0.50		ppbv	
		Vinyl Acetate	2014/12/08	<0.20		ppbv	
	RPD - Sample/Sample Dup	Dichlorodifluoromethane (FREON 12)	2014/12/08	NC		%	25
		1,2-Dichlorotetrafluoroethane	2014/12/08	NC		%	25
		Chloromethane	2014/12/08	NC		%	25
		Chloroethane	2014/12/08	NC		%	25
		Trichlorofluoromethane (FREON 11)	2014/12/08	NC		%	25
		Ethanol (ethyl alcohol)	2014/12/08	NC		%	25
		2-propanol	2014/12/08	NC		%	25
		2-Propanone	2014/12/08	NC		%	25
		Methyl Ethyl Ketone (2-Butanone)	2014/12/08	NC		%	25
		Methyl Isobutyl Ketone	2014/12/08	NC		%	25
		Methyl Butyl Ketone (2-Hexanone)	2014/12/08	NC		%	25
		Methyl t-butyl ether (MTBE)	2014/12/08	NC		%	25
		Ethyl Acetate	2014/12/08	NC		%	25
		1,1-Dichloroethylene	2014/12/08	NC		%	25
		cis-1,2-Dichloroethylene	2014/12/08	NC		%	25
		trans-1,2-Dichloroethylene	2014/12/08	NC		%	25
		Methylene Chloride(Dichloromethane)	2014/12/08	NC		%	25
		1,1-Dichloroethane	2014/12/08	NC		%	25
		1,1,1-Trichloroethane	2014/12/08	NC		%	25
		1,2-Dichloropropane	2014/12/08	NC		%	25
		Bromomethane	2014/12/08	NC		%	25
		Bromoform	2014/12/08	NC		%	25
		Tetrachloroethylene	2014/12/08	NC		%	25
		Toluene	2014/12/08	NC		%	25
		Ethylbenzene	2014/12/08	NC		%	25
		p+m-Xylene	2014/12/08	NC		%	25
		o-Xylene	2014/12/08	NC		%	25
		Styrene	2014/12/08	NC		%	25
		4-ethyltoluene	2014/12/08	NC		%	25
		1,3,5-Trimethylbenzene	2014/12/08	NC		%	25
		1,2,4-Trimethylbenzene	2014/12/08	NC		%	25
		Chlorobenzene	2014/12/08	NC		%	25
		1,3-Dichlorobenzene	2014/12/08	NC		%	25
		1,4-Dichlorobenzene	2014/12/08	NC		%	25
		1,2-Dichlorobenzene	2014/12/08	NC		%	25
		1,2,4-Trichlorobenzene	2014/12/08	NC		%	25
		Hexane	2014/12/08	NC		%	25
		Heptane	2014/12/08	NC		%	25
		Cyclohexane	2014/12/08	NC		%	25
		Tetrahydrofuran	2014/12/08	NC		%	25
		1,4-Dioxane	2014/12/08	NC		%	25
		Total Xylenes	2014/12/08	NC		%	25
		Propene	2014/12/08	NC		%	25

Maxxam Analytics International Corporation o/a Maxxam Analytics 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.maxxam.ca

CEM Services Inc
Attention: Sean MacKay
Client Project #: L&RR LANDFILL
P.O. #: 074229
Site Location:

Quality Assurance Report (Continued)

Maxxam Job Number: GB4N0852

QA/QC Batch Num Init	QC Type	Parameter	Date Analyzed yyyy/mm/dd	Value	%Recovery	Units	QC Limits
3853498 LSY	RPD - Sample/Sample Dup	2,2,4-Trimethylpentane	2014/12/08	NC		%	25
		Carbon Disulfide	2014/12/08	2.6		%	25
		Vinyl Acetate	2014/12/08	NC		%	25

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.
Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.
Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.
NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (one or both samples < 5x RDL).

Maxxam Analytics International Corporation o/a Maxxam Analytics 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.maxxam.ca

Method 25
Analytical Results

prepared for

CEMSERVICES, INC.
360 Old Colony Road, Suite 1
Norton, MA 02766

by

Triangle Environmental Services, Inc.

We, the undersigned, certify to the best of our knowledge that all analytical data presented in this report have been checked for completeness; that the results are accurate, error-free, legible, and have been obtained in accordance with approved protocol; and that all deviations and analytical problems are summarized in the "Comments on the Analyses" page(s).

Approved by:

Wayne A. Stollings
President

Reviewed by:

Donna Nolen-Weathington
Method 25 Supervisor

Report
14129

December 23, 2014

P.O. Box 13294 Research Triangle Park, NC 27709 (800) 367-4862

Triangle Environmental Services, Inc.
COMMENTS ON THE ANALYSES

Report #14129 for CEMServices, Inc.
Project ID: L & RR

Traps Received: 12/5/14 with dry ice
Tanks Received: 12/9/14

Samples Analyzed: 12/16-21/14 on Analyzer A
Client Chain-of-Custody forms: 1 pg

Abbreviations and Definitions:

DF: dilution factor(s)
CL: calibration limit = lowest concentration of initial calibration standard ×DF
RL: report limit = calibration limit (CL)

General:

- The analytical system indicates a background concentration of (1) "CO" due to the interference of O_2 resulting from the coelution of O_2 and CO and (2) CO_2 due to CO_2 and organic compounds in the recovery carrier gas. The CO, CO_2, and condensibles concentrations in the report are calculated using a "blank" correction, which results in a more accurate reporting and a better comparison of these concentrations in the analyses.

- The presence of organic compounds in the sample tank that should have condensed in the dry ice trap **may** result in an underreporting of those compounds (especially if oxygenated).

- A concentration of noncondensibles or condensibles of less than the RL is considered to be zero in computing the TGNMO.

All Samples: The tank contents were diluted so as to bring the measured CO_2 concentrations for each of these samples and the measured CH_4 concentrations for samples #4-6 within the Method 25 calibration range. The reported final tank pressure is the original final tank pressure multiplied by the dilution factor.

Samples #1-3: The traps for these samples were plugged during the CO_2 flush prior to the recovery of the condensible fraction. The traps were partially (≈5% each) removed from the dry ice to allow melting of the plug before the flush could be resumed. Note that ice present in the trap may be accompanied by CO_2 (entrapped in the ice and therefore not flushable), which would then be reported as part of the **organic** carbon in the amount of condensibles.

Triangle Environmental Services, Inc.

METHOD 25 TABLE OF RESULTS

Client: CEM Services ID#14129 Analyzed: 12/16-21/14

Project ID: L & RR

	Sample Description	Concentrations (ppmC)						Mass Conc. (mgC/cu.m)
		CO	CH4	CO2	Noncon-densibles	Conden-sibles	TGNMO	
1	Outlet 1	292	5701	48291	75	25	100	50
2	Outlet 2	593	4576	37717	68	18	86	43
3	Outlet 3	828	5791	52284	77	157	234	117
4	Inlet 1	< 255	244739	213087	< 102	1195	1195	597
5	Inlet 2	< 238	304700	263892	< 96	1328	1328	663
6	Inlet 3	< 332	291320	256101	< 133	1314	1314	656

< # = Concentration Below Report Limit

* Please refer to the "Comments on the Analyses" page of the report for additional information.

Triangle Environmental Services, Inc.
CALIBRATION DATA FOR THE ANALYSES

Client: CEMServices, Inc. ID#14129

Project ID: L & RR

Method 25

21-DEC-1: Analyzer A
Preanalysis Calibration

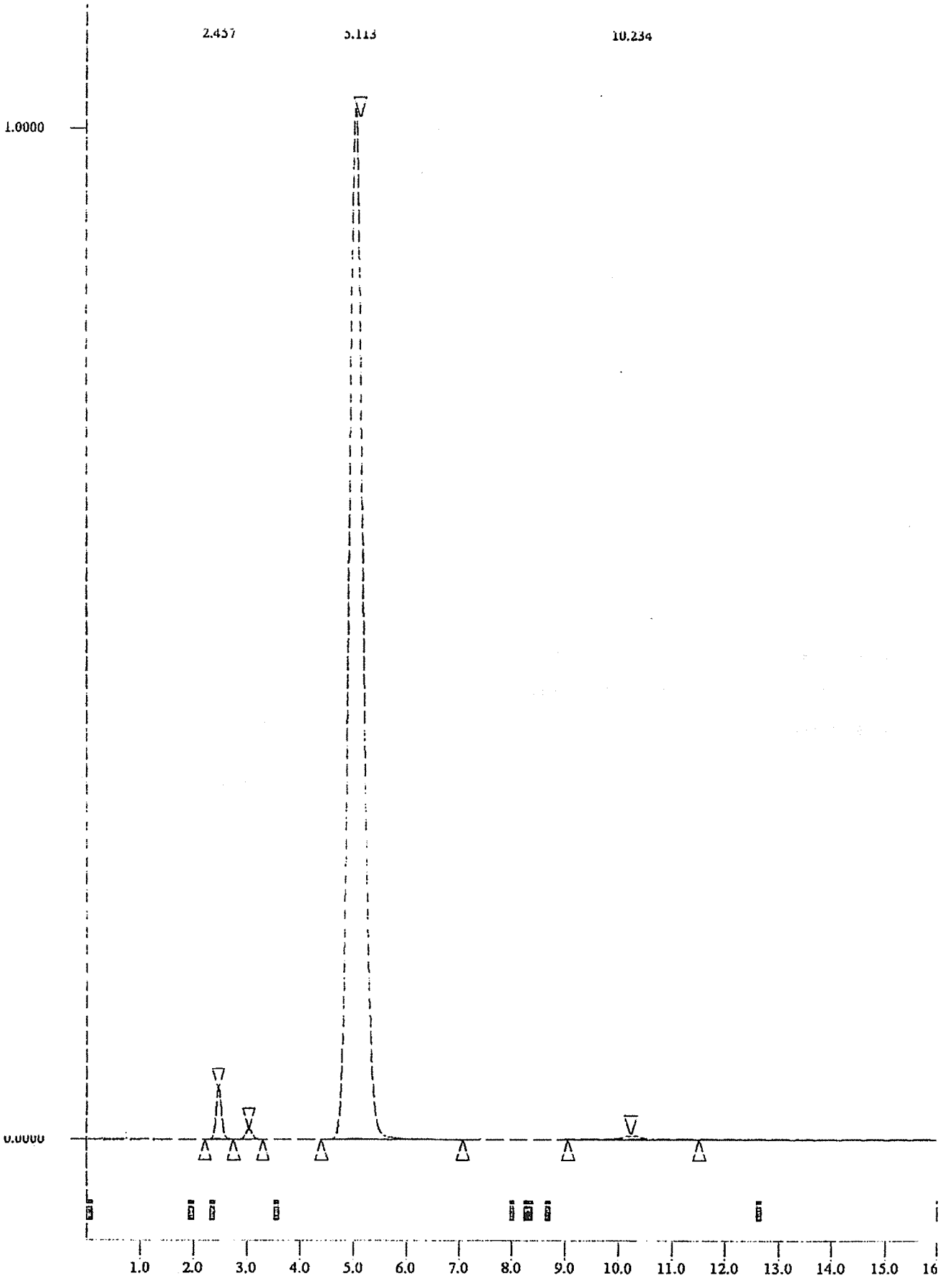
Compound	Conc.	Area(1)	Area(2)	Area(3)	Average	%RSD	RF	IRF	%Diff.
CO	200.5	36508	36222	36348	36359	0.4%	181.3	175.7	3.2%
CH4	49.1	8985	8911	8998	8965	0.5%	182.5	181.5	0.5%
CO2	9950.0	1899656	1897757	1897515	1898309	0.1%	190.8	191.9	-0.6%
C2+	61.7	11628	11604	11328	11520	1.4%	186.9	194.8	-4.1%

Postanalysis Calibration

Compound	Conc.	Area(1)	Area(2)	Area(3)	Average	RF(post)	RF(pre)	%Diff
CO	200.5	35959	36414	36374	36249	180.8	181.3	-0.3%
CH4	49.1	8767	8751	8889	8802	179.2	182.5	-1.8%
CO2	9950.0	1897568	1899349	1898943	1898620	190.8	190.8	0.0%
C2+	61.7	11745	11592	11430	11589	188.0	186.9	0.6%

Sample # 1 6182P / HE
2 6102 / ALX
3 6183P / ALH
4 207 / AJS
5 114 / IK
6 176 / XA

Conc. = concentration in ppmC, %RSD = % relative standard deviation,
RF = response factor = Average Area/Conc., IRF = response factor from initial calibration,
%Diff. = %(RF-IRF)/IRF for preanalysis/= %(RF(post)-RF(pre)/RF(pre), C2+ = propane



Filename: C:\STARGEOALLOATES_AS97.RUN Channel: A = M23

Title :
Run File : C:\STAR\RECALCA\IES_A397.RUN
Sample ID : 1- F mix CC61467

Injection Date: 21-DEC-14 12:05 PM Calculation Date: 21-DEC-14 12:21 PM

Workstation: MS-DOS_6 Bus Address : 16
Channel : A = M25 Run Time : 16.002 min

Version 4.5 **********

Run Mode : Analysis - Subtract Blank Baseline
Calculation Type: External Standard

No.	Name	()	Ret. Time (min)	Time (min)	(counts)	Code	Width (sec)	Status Codes
1	CO	160.9562	7.457	0.057	56508	BV	6.6	
2						VB	9.1	
3	CO2	8059.6909	9.113	0.113	1899656	BB	17.5	
4					11628	GR	0.0	U

Status Codes:

Total Unidentified Counts : 0 counts

Identified Peaks: 4

Multiplier: 1 Divisor: 1

Baseline Offset: 6 microVolts

Noise (used): 150 microVolts - monitored before this run

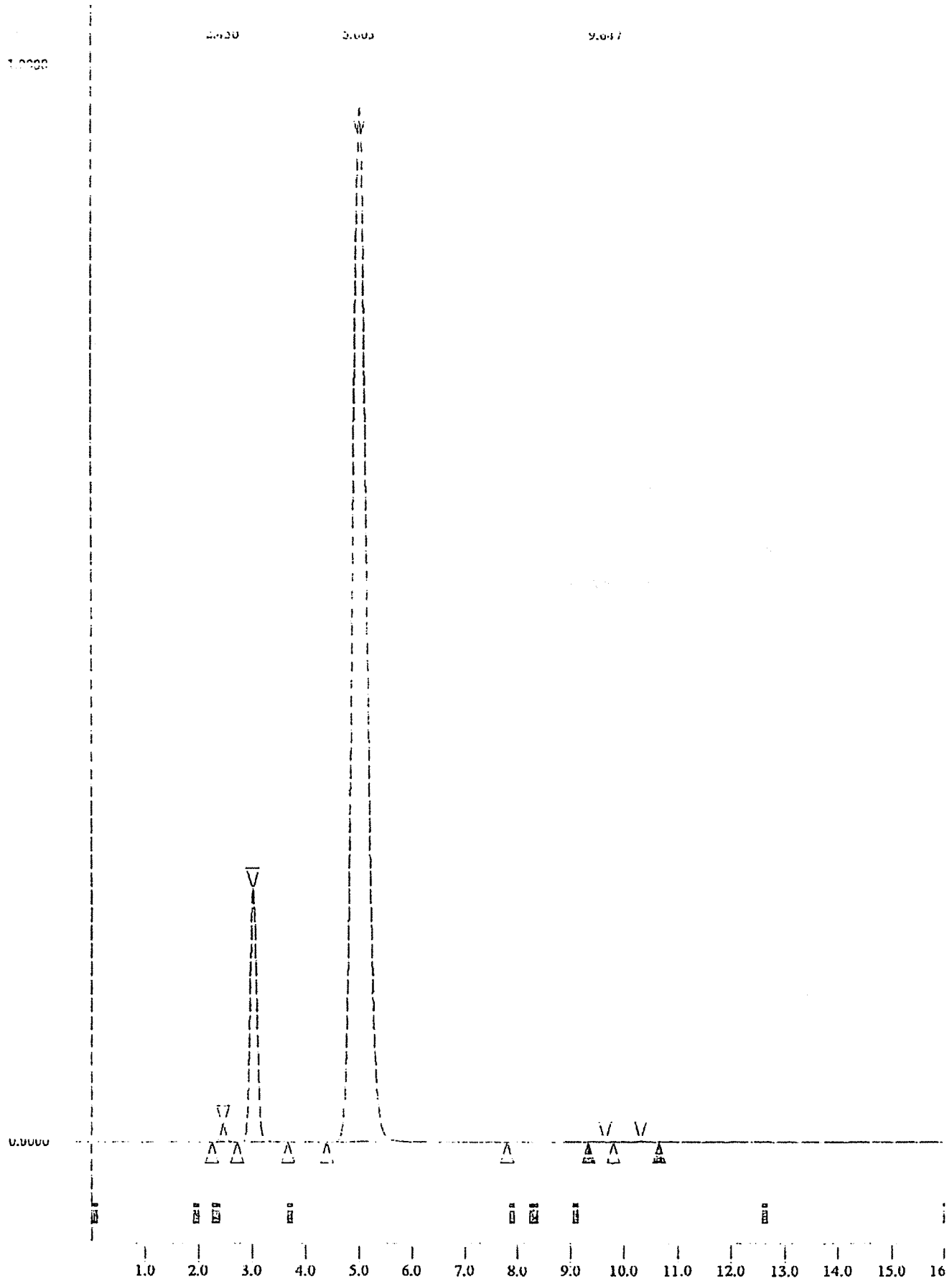
Install the driver for the module at address 17 (type 8) to format this data.

Error log:

Could not format the error log for the module at address 17 (type 8).
to format this data.

ADC Board:

****



Filename: C:\STARKRECALCAITES_A129.RON Channel: A = M25

Title :
Run File : C:\STAR\RECALCA\TES_A429.RUN
C:\STAR\RECALCA.MTH
Sample ID : 6- tank 6182P

Injection Date: 21-DEC-14 9:46 PM Calculation Date: 22-DEC-14 11:48 AM

Workstation: MS-DOS_6 Bus Address : 16

Channel : A - M25 Run Time : 16.002 min

Run Mode : Analysis - Subtract Blank Baseline

Calculation Type: External Standard

No.	Name	Ret. Time (min)	Time (min)	Width (counts)	Code	(sec)	Status Codes
1	CO	45.3430	2.450	0.050	10285	BV	6.6	
2			3.010	0.010	200723	VB	7.9	C
3	CO2	7532.2456	5.003	0.003	1775347	BB	17.7	
							0.0	U
---	---	---	---	---	---	---	---	---
					1949020			

Status Codes:
component(s)
C - Out of calibration range

0 counts

Detected Peaks: 5 Rejected Peaks: 0 Identified Peaks: 4

Baseline Offset: 2 microvolts

run

Could not format the injection information for this run.
to format this data.

Calib. out of range; No Recovery Action Specified

Log:

Could not format the error log for the module at address 17 (type 8).
to format this data.

ADC Board:

****

Triangle Environmental Services, Inc.
METHOD 25 PROCEDURES

Report #14129

CALIBRATION

The calibrations satisfy the requirements for Methods 25, 25-C, and 10-B.

Triplicate injections of a calibration gas mixture consisting of carbon monoxide (≈200 ppm), methane (≈50 ppm), carbon dioxide (≈10,000 ppm), and propane(≈20 ppm) are made immediately before and after each batch of samples. Daily response factors are calculated from the pre-batch integrated responses (average area count / concentration in ppmC) and must agree within 10% of the response factors of the initial calibrations. Further, the post-batch response factors must agree within 2% of the pre-batch response factors. Both criteria must be met before the analyses are considered valid.

CONDENSATE RECOVERY

To flush the trap of CO_2, hydrocarbon-free air is flushed through the trap maintained at -78 °C into the sample tank until less than 10 ppm CO_2 is detected in the flow stream (the concentration of CO_2 is monitored with an NDIR CO_2 detector and measured using a CO_2 analyzer). The sample tank is pressurized to about 1200 mm Hg for analysis and is replaced with an intermediate collection vessel (ICV).

To oxidize the organic material in the trap, hydrocarbon-free air is then passed through the trap heated to 200 °C and the recovery oxidation catalyst into the ICV until less than 10 ppm CO_2 is detected in the flow stream. The ICV is pressurized to at least 1200 mm Hg for analysis.

ANALYSIS

All samples, which include the daily calibration gas mixture, sample tanks, and ICVs, are analyzed in triplicate using a computer-interfaced gas chromatograph equipped with an automated gas sampling system and a flame ionization detector (FID). CO, CH_4, and CO_2 are eluted from the Unibead 1S-Carbosieve G column and pass through the analytical oxidation and reduction catalyst to the FID. The column is then backflushed to elute the nonmethane organic (NMO) fraction, which passes through the analytical oxidation and reduction catalysts to the FID.

CALCULATIONS

Calculations are done in accord with USEPA Method 25 procedures. A sample calculation for one of the samples is provided in the report. CO and CO_2 blanks are used to compensate for a background concentration of (1) "CO" due to the interference of O_2 resulting from the coelution of O_2 and CO and (2) CO_2 due to CO_2 and organic compounds in the recovery carrier gas. A concentration of noncondensibles or condensibles of less than the RL is considered to be zero in computing the TGNMO.

EQUIPMENT

Tanks and ICVs are at a minimum twice evacuated and filled with ambient air filtered through charcoal and are then evacuated to below 10 mm Hg and monitored for at least an hour to check that the tanks do not leak more than 1 mm Hg/hour. They are then pressurized to greater than ambient pressure with helium, analyzed to ensure < 2 ppmC NMO, and stored for later use.

Traps are flushed at 300 °C for at least 30 minutes with compressed air. Each trap is then flushed at 350 °C for thirty minutes with hydrocarbon-free air. The effluent is then routed through an oxidation catalyst and a reduction catalyst for analysis by FID-GC to confirm less than 10 ppmC total C.

Sampling units are reconditioned by replacing filters and checking that all sections operate properly. The unit is heated (with a PTFE line used in place of a trap) and is flushed with zero air for at least thirty minutes before an aliquot of this flow is injected into the analyzer. If the total carbon concentration is below 10 ppm, the unit is made ready for use and stored for shipment.

Certifications:

South Coast Air Quality Management District: ID# 94 LA 0401
New Jersey NELAP ID: NC004
Pennsylvania DEP: Registration #68-3321

Triangle Environmental Services, Inc.

METHOD 25 SAMPLE CALCULATION

Client: CEM Services ID#14129 Analyzed: 12/16-21/14

Project ID: L & RR

Sample # 1 Outlet 1

D A T A

Note: All pressure values have been converted when necessary to mm Hg and all temperature values to Kelvin.

Pressure, Temperature, Volume Data:

	Pressure (mm Hg)	Temp. (K)
Presampling	4.0	294.15
Postsampling	752.0	294.15
Lab Receipt	786.0	294.15
Tank Final	3883.4	294.15
CV Final	1393.0	294.15

Tank 6182P:
Tank Volume = 0.005721 cu.m

Trap HE →
Collection Vessel 97:
CV Volume = 0.005780 cu.m

Response Factors (RF), Report Limits (RL), and Area Counts:

	RF (area/ppmC)	RL (ppmC)	Area 1	Area 2	Area 3
CO	181.3	26	10,285	10,154	10,183
CH4	182.5	16	200,723	200,301	200,187
CO2	190.8	16	1,775,347	1,774,733	1,775,837
Noncondensibles	186.9	11	2,665	2,656	2,726
Condensibles	190.8	6	3,196	3,085	3,074

CO Blank = 0 area counts CO2 Blank = 3 ppm

C A L C U L A T I O N S

Measured Concentrations, corrected for blank (ppmC):

Cm(CO) = [Area(CO) - CO Blank] / RF(CO)
= [10285 - 0] / 181.3 = 56.7
= [10154 - 0] / 181.3 = 56.0
= [10183 - 0] / 181.3 = 56.2

Cm(CH4) = Area(CH4)/RF(CH4)
= 200723 / 182.5 = 1099.9
= 200301 / 182.5 = 1097.5
= 200187 / 182.5 = 1096.9

Cm(CO2) = Area(CO2)/RF(CO2) - CO2 Blank
= 1775347 / 190.8 - 3 = 9301.8
= 1774733 / 190.8 - 3 = 9298.5
= 1775837 / 190.8 - 3 = 9304.3

Cm(Noncondensibles) = Area(Noncondensibles)/RF(Noncondensibles)
= 2665 / 186.9 = 14.3
= 2656 / 186.9 = 14.2
= 2726 / 186.9 = 14.6

Cm(Condensibles) = Area(Condensibles)/RF(Condensibles) - CO2 Blank
= 3196 / 190.8 - 3 = 13.8
= 3085 / 190.8 - 3 = 13.2
= 3074 / 190.8 - 3 = 13.1

Pressure-Temperature Ratio, Q(i) = P(i)/T(i) (mm Hg/K):

Tank Presampling:	Q(2) =	4.0 / 294.15 = 0.014
Tank Postsampling:	Q(1) =	752.0 / 294.15 = 2.557
Tank Lab Receipt:	Q(5) =	786.0 / 294.15 = 2.672
Tank Final:	Q(3) =	3883.4 / 294.15 =13.202
CV Final:	Q(4) =	1393.0 / 294.15 = 4.736

Volume Sampled (dscm) = 0.3857 x Tank Volume x [Q(1)-Q(2)]
= 0.3857 x 0.005721 x [2.557 - 0.014]
= 0.005611

Averages and % Relative Standard Deviations (%RSD) of Cm's are calculated.
(%RSD of C=%RSD of Cm)

Calculated Concentrations (ppmC):

C(CO) = Q(3)/[Q(1)-Q(2)] x Cm(CO)
= 13.202/(2.557 - 0.014) x 56.3 = 292.3

C(CH4) = Q(3)/[Q(1)-Q(2)] x Cm(CH4)
= 13.202/(2.557 - 0.014) x 1098.1 = 5701.0

C(CO2) = Q(3)/[Q(1)-Q(2)] x Cm(CO2)
= 13.202/(2.557 - 0.014) x 9301.5 = 48290.9

C(Noncondensibles) = Q(3)/[Q(1)-Q(2)] x Cm(Noncondensibles)
= 13.202/(2.557 - 0.014) x 14.4 = 74.5

C(Condensibles)
= Volume(CV)/Volume(Tank) x Q(4)/[Q(1)-Q(2)] x Cm(Condensibles)
= 0.005780/0.005721 x 4.736/(2.557 - 0.014) x 13.3 = 25.1

Total Gaseous Non-Methane Organics(TGNMO)=C(Noncondensibles)+C(Condensibles)
= 74.5 + 25.1
= 99.6

Mass Concentration (mgC/cu.m)
= 0.4993 x TGNMO
= 0.4993 x 99.6 = 49.7

Triangle Environmental Services, Inc.
METHOD 25 SAMPLE QA/QC DATA

Report #14129

DAILY RECOVERY SYSTEM CHECKS

11.1.1.1* **Condensate Recovery System Leak Check**

Evacuate system to ≤10 mm Hg absolute pressure, isolate system, and monitor for ten minutes.

Requirement: Pressure Change ≤3 mm Hg

11.1.1.2* **Condensate Recovery System Background Test**

Analyze recovery system effluent for CO_2 concentrations.

Requirement: CO_2 ≤ 10 ppm

11.1.1.3* **Condensate Oxidation Catalyst Efficiency Check** (Initial Check: 10.1.1.2)

Analyze 1% methane standard through oxidation catalyst.

Requirement: $CO_2 = CH_4$ concentration ± 4%

DAILY ANALYZER CHECKS

10.2* **Daily Calibration**

Response Factor Checks

Requirement: Daily RF = Initial RF ± 10%

Triplicate injections of a mixture of CO, CH_4, CO_2, and C_3H_8 are made before and after each batch of samples.

See the individual sample data sheet for the daily response factor.

10.1.2.3* **Initial Calibration/Linearity**

Triplicate injections of a calibration gas is made for each compound at four levels:

	Nominal Concentrations (ppm)				Initial RF for Analyzer A 10/22/13	Initial RF for Analyzer B 02/04/13
CO	5	200	1000	5000	175.65	258.55
CH_4	3	50	500	10,000	181.49	284.14
CO_2	3	50	500	10,000	191.86	269.67
propane	2	20	3000	10,000	194.84	272.02

* USEPA Method 25 Protocol (2000) Reference Number

Report #14129

INITIAL CONDENSATE RECOVERY SYSTEM CHECKS

10.1.1.1* **Carrier Gas and Auxiliary Gas Blank Check**

Requirement: $CO + CH_4 + CO_2 + NMO \leq 5$ ppm

10.1.1.3* **System Performance Check** March 1-8, 2000; Recovery Systems #1, 2, 3, 4

Volume Injected	Compound	Average % Recovery				% RSD			
50 µL	Hexane	101.0	102.0	98.8	104.6	0.058	0.101	1.680	0.229
50 µL	Decane	97.0	100.0	103.3	103.3	0.120	0.047	0.092	0.359
10 µL	Hexane	104.0	101.8	103.9	96.8	0.118	0.827	0.131	0.845
10 µL	Decane	98.0	97.0	99.6	99.0	0.119	0.232	1.360	0.092
	Requirement:	100 ± 5%				≤2%			

INITIAL NMO ANALYZER PERFORMANCE CHECKS

10.1.2.1* **Oxidation Catalyst Efficiency Check** Analyzer A, 4/8/98; Analyzer B, 4/21/98

FID response with reduction catalyst in bypass mode = 0, 0
Requirement: ≤1%

10.1.2.2* **Reduction Catalyst Efficiency Check** Analyzer A, 4/8/98; Analyzer B, 4/21/98

Response of CH_4 with oxidation and reduction catalysts in series mode and response with both catalysts in bypass mode to be within 5% of the average:
1.05 x Average Response > Response > 0.95 Average Response
or Higher Response/Lower Response < 1.105263
100.0%, 100.0% Requirement: < 110.5%

* USEPA Method 25 Protocol (2000) Reference Number

10.1.2.3* **Analyzer Linearity Check+NMO Calibration** Analyzer A, 10/22/13;Analyzer B, 02/04/13

	$100\times(1-RF/RF_{average})$		Requirement:
max. dev. CO:	+1.876%,	+2.259%	± 2.5%
max. dev. CH_4:	-1.775%,	-2.500%	± 2.5%
max. dev. CO_2:	-2.403%,	-1.233%	± 2.5%
max. dev. NMO:	-1.960%,	+1.150%	± 2.5%
max. %RSD:	1.67%,	1.50%	≤ 2%
$\frac{RF\ (NMO)}{RF\ (CO_2)}$ =	0.98,	0.99	1.0 ± 0.1

10.1.2.4* **System Performance Check** Analyzer A, 4/8/98; Analyzer B, 4/21/98, 5/1/98

	Measured Value, Expected Value		Requirement
	Analyzer A	Analyzer B	
Propane in Mix	19.6, 20.0	20.22, 20.0	± 5%
Hexane	50.6, 51.6	51.6, 51.6	± 5%
Toluene	20.3, 20.0	19.34, 20.0	± 5%
Methanol	104.5, 109.1	109.55, 109.0	± 5%

EQUIPMENT CHECKS

8.1.1* **Clean Sampling Equipment Check**

Sample Unit	<10	ppmC total C	@ 100%
Trap	<10	ppmC total C	@ 100%
Tank	< 2	ppmC NMO	@ 100%

8.1.2* **Sample Tank Evacuation and Leak Check**

Tank evacuated to ≤ 10 mm Hg absolute pressure, monitored for ≥ 1 hour, and passed for use if no pressure change (< 1 mm Hg/hr) is noted.

10.3* **Sample Tank and ICV Volumes**

Tank weighed empty, filled with deionized distilled water (temperature recorded), and weighed to the nearest 2 g. Volume calculated based on density of water at that temperature and results recorded in permanent file.

* USEPA Method 25 Protocol (2000) Reference Number

Triangle Environmental Services, Inc.

METHOD 25 DATA REPORT

Client: CEM Services ID#14129 Analyzed: 12/16-21/14

Project ID: L & RR

Sample # 1 Outlet 1

Pressure, Temperature, Volume Data:

	Pressure (mm Hg)	Temp. (K)	P/T
Presampling	4.0	294.15	0.014
Postsampling	752.0	294.15	2.557
Lab Receipt	786.0	294.15	2.672
Tank Final	3883.4	294.15	13.202
CV Final	1393.0	294.15	4.736

Tank 6182P:
Tank Volume = 0.005721 cu.m
Volume Sampled = 0.005611 dscm

$\frac{\text{Lab Receipt P/T}}{\text{Postsampling P/T}} = 1.045$

Trap HE →
Collection Vessel 97:
CV Volume = 0.005780 cu.m

Response Factors (RF), Report Limits (RL), and Area Counts:

	RF (area/ppmC)	RL (ppmC)	Area 1	Area 2	Area 3
CO	181.3	26	10,285	10,154	10,183
CH4	182.5	16	200,723	200,301	200,187
CO2	190.8	16	1,775,347	1,774,733	1,775,837
Noncondensibles	186.9	11	2,665	2,656	2,726
Condensibles	190.8	6	3,196	3,085	3,074

Recovery Oxidation Catalyst Efficiency Check: CO2/CH4 = 96.8%
CO Blank = 0 area counts CO2 Blank = 3 ppm

Concentrations:

*=corrected for Blank	ppmC Amount	±	SD	%RSD
CO*	292	±	2	0.7
CH4	5701	±	8	0.1
CO2*	48291	±	15	0.0
Noncondensibles	75	±	1	1.4
Condensibles*	25	±	1	2.7
TGNMO	100			

Mass Concentration 50 mgC/cu.m

Triangle Environmental Services, Inc.

METHOD 25 DATA REPORT

Client: CEM Services ID#14129 Analyzed: 12/16-21/14

Project ID: L & RR

Sample # 2 Outlet 2

Pressure, Temperature, Volume Data:

	Pressure (mm Hg)	Temp. (K)	P/T
Presampling	6.0	294.15	0.020
Postsampling	739.0	294.15	2.512
Lab Receipt	757.0	294.15	2.574
Tank Final	2904.2	294.15	9.873
CV Final	1314.0	294.15	4.467

Tank 6102:
Tank Volume = 0.005791 cu.m
Volume Sampled = 0.005566 dscm

$\frac{\text{Lab Receipt P/T}}{\text{Postsampling P/T}} = 1.024$

Trap ALX →
Collection Vessel 85:
CV Volume = 0.005789 cu.m

Response Factors (RF), Report Limits (RL), and Area Counts:

	RF (area/ppmC)	RL (ppmC)	Area 1	Area 2	Area 3
CO	181.3	20	27,215	27,163	27,041
CH4	182.5	12	211,066	210,924	210,352
CO2	190.8	12	1,817,484	1,816,869	1,816,404
Noncondensibles	186.9	8	3,175	3,195	3,232
Condensibles	190.8	6	2,549	2,428	2,544

Recovery Oxidation Catalyst Efficiency Check: CO2/CH4 = 96.8%
CO Blank = 0 area counts CO2 Blank = 3 ppm

Concentrations:

*=corrected for Blank	ppmC Amount	±	SD	%RSD
CO*	593	±	2	0.3
CH4	4576	±	8	0.2
CO2*	37717	±	11	0.0
Noncondensibles	68	±	1	0.9
Condensibles*	18	±	1	3.5
TGNMO	86			

Mass Concentration 43 mgC/cu.m

Triangle Environmental Services, Inc.

METHOD 25 DATA REPORT

Client: CEM Services ID#14129 Analyzed: 12/16-21/14

Project ID: L & RR

Sample # 3 Outlet 3

Pressure, Temperature, Volume Data:

	Pressure (mm Hg)	Temp. (K)	P/T
Presampling	4.0	294.15	0.014
Postsampling	657.0	294.15	2.234
Lab Receipt	683.0	294.15	2.322
Tank Final	4409.9	294.15	14.992
CV Final	1395.0	294.15	4.742

Tank 6183P:
Tank Volume = 0.005796 cu.m
Volume Sampled = 0.004963 dscm

$\frac{\text{Lab Receipt P/T}}{\text{Postsampling P/T}} = 1.040$

Trap ALH →
Collection Vessel 99:
CV Volume = 0.005779 cu.m

Response Factors (RF), Report Limits (RL), and Area Counts:

	RF (area/ppmC)	RL (ppmC)	Area 1	Area 2	Area 3
CO	181.3	34	22,289	22,255	22,175
CH4	182.5	21	156,440	156,559	156,482
CO2	190.8	21	1,476,605	1,478,794	1,477,787
Noncondensibles	186.9	14	2,140	2,146	2,137
Condensibles	190.8	7	14,692	14,373	14,791

Recovery Oxidation Catalyst Efficiency Check: CO2/CH4 = 96.8%
CO Blank = 0 area counts CO2 Blank = 3 ppm

Concentrations:

*=corrected for Blank	ppmC Amount	±	SD	%RSD
CO*	828	±	2	0.3
CH4	5791	±	2	0.0
CO2*	52284	±	39	0.1
Noncondensibles	77	±	0	0.2
Condensibles*	157	±	2	1.6
TGNMO	234			

Mass Concentration 117 mgC/cu.m

Triangle Environmental Services, Inc.

METHOD 25 DATA REPORT

Client: CEM Services ID#14129 Analyzed: 12/16-21/14

Project ID: L & RR

Sample # 4 Inlet 1

Pressure, Temperature, Volume Data:

	Pressure (mm Hg)	Temp. (K)	P/T
Presampling	327.0	294.15	1.112
Postsampling	697.0	294.15	2.370
Lab Receipt	714.0	294.15	2.427
Tank Final	18817.9	294.15	63.974
CV Final	1380.0	294.15	4.691

Tank 207:
Tank Volume = 0.008367 cu.m
Volume Sampled = 0.004059 dscm

$\frac{\text{Lab Receipt P/T}}{\text{Postsampling P/T}} = 1.024$

Trap AJS →
Collection Vessel 26:
CV Volume = 0.008346 cu.m

Response Factors (RF), Report Limits (RL), and Area Counts:

	RF (area/ppmC)	RL (ppmC)	Area 1	Area 2	Area 3
CO	181.3	255	0	0	0
CH4	182.5	153	878,080	878,312	878,229
CO2	190.8	153	799,807	800,029	800,094
Noncondensibles	186.9	102	0	0	0
Condensibles	190.8	12	61,764	61,823	62,029

Recovery Oxidation Catalyst Efficiency Check: CO2/CH4 = 96.8%
CO Blank = 0 area counts CO2 Blank = 3 ppm

Concentrations:

*=corrected for Blank	ppmC Amount	±	SD	%RSD
CO*	< 255			
CH4	244739	±	33	0.0
CO2*	213087	±	40	0.0
Noncondensibles	< 102			
Condensibles*	1195	±	3	0.2

Note: A concentration of noncondensibles or condensibles of less than the RL is considered to be zero in computing the TGNMO value.

TGNMO 1195

Mass Concentration 597 mgC/cu.m

< # = Concentration Below Report Limit

Triangle Environmental Services, Inc.

METHOD 25 DATA REPORT

Client: CEM Services ID#14129 Analyzed: 12/16-21/14

Project ID: L & RR

Sample # 5 Inlet 2

Pressure, Temperature, Volume Data:

	Pressure (mm Hg)	Temp. (K)	P/T
Presampling	326.0	294.15	1.108
Postsampling	762.0	294.15	2.591
Lab Receipt	800.0	294.15	2.720
Tank Final	20722.2	294.15	70.448
CV Final	1481.0	294.15	5.035

Tank 114:
Tank Volume = 0.008335 cu.m
Volume Sampled = 0.004765 dscm

$\frac{\text{Lab Receipt P/T}}{\text{Postsampling P/T}} = 1.050$

Trap IK →
Collection Vessel 14:
CV Volume = 0.008349 cu.m

Response Factors (RF), Report Limits (RL), and Area Counts:

	RF (area/ppmC)	RL (ppmC)	Area 1	Area 2	Area 3
CO	181.3	238	0	0	0
CH4	182.5	143	1,170,642	1,168,894	1,170,470
CO2	190.8	143	1,060,409	1,059,422	1,060,050
Noncondensibles	186.9	96	0	0	0
Condensibles	190.8	11	75,001	74,930	75,172

Recovery Oxidation Catalyst Efficiency Check: CO2/CH4 = 97.8%
CO Blank = 0 area counts CO2 Blank = 3 ppm

Concentrations:

*=corrected for Blank	ppmC Amount	± SD	%RSD
CO*	< 238		
CH4	304700	± 251	0.1
CO2*	263892	± 124	0.0
Noncondensibles	< 96		
Condensibles*	1328	± 2	0.2

Note: A concentration of noncondensibles or condensibles of less than the RL is considered to be zero in computing the TGNMO value.

TGNMO 1328

Mass Concentration 663 mgC/cu.m

< # = Concentration Below Report Limit

Triangle Environmental Services, Inc.

METHOD 25 DATA REPORT

Client: CEM Services ID#14129 Analyzed: 12/16-21/14

Project ID: L & RR

Sample # 6 Inlet 3

Pressure, Temperature, Volume Data:

	Pressure (mm Hg)	Temp. (K)	P/T
Presampling	324.0	294.15	1.101
Postsampling	793.0	294.15	2.696
Lab Receipt	812.0	294.15	2.760
Tank Final	31134.0	294.15	105.844
CV Final	1309.0	294.15	4.450

Tank 176:
Tank Volume = 0.008358 cu.m
Volume Sampled = 0.005140 dscm

$\frac{\text{Lab Receipt P/T}}{\text{Postsampling P/T}} = 1.024$

Trap XA →
Collection Vessel 15:
CV Volume = 0.008354 cu.m

Response Factors (RF), Report Limits (RL), and Area Counts:

	RF (area/ppmC)	RL (ppmC)	Area 1	Area 2	Area 3
CO	181.3	332	0	0	0
CH4	182.5	200	803,735	800,750	798,172
CO2	190.8	200	739,688	736,359	733,918
Noncondensibles	186.9	133	0	0	0
Condensibles	190.8	9	90,632	90,391	90,384

Recovery Oxidation Catalyst Efficiency Check: CO2/CH4 = 98.2%
CO Blank = 0 area counts CO2 Blank = 3 ppm

Concentrations:

*=corrected for Blank	ppmC Amount	± SD	%RSD
CO*	< 332		
CH4	291320	±1013	0.3
CO2*	256101	±1008	0.4
Noncondensibles	< 133		
Condensibles*	1314	± 2	0.2

Note: A concentration of noncondensibles or condensibles of less than the RL is considered to be zero in computing the TGNMO value.

TGNMO 1314

Mass Concentration 656 mgC/cu.m

< # = Concentration Below Report Limit

Chain of Custody

Triangle Environmental Services, Inc.
LABORATORY SAMPLE INFORMATION AND CHAIN-OF-CUSTODY FORM

Company Name: CENSERVICES		Project/Client ID: L & RR	Date: ~~12/12~~ 12/2/14
Contact Person: Sean MacKay	Phone #: 508 958 4387	Process Type:	
Email: SMACKAY@CENSERVICES.COM	Note: Normal Turnaround is 15 working days after receipt of complete set of samples	Results Due Date:	Extra charge will apply for rush results
☑ Electronic Report ☐ Hard copy Report ☐ Fax Results		Report Package Due Date:	

Send Report to: (Street address required for Fed Ex shipment of report)	Person Sean MacKay Company CENSERVICES Address 360 Old Colony Rd, Suite 1 Norton MA	Send Invoice to: (if different from report address)	Person Kristen Miller Company SAME Address
Phone # 506 226 6700	FAX # 508 226 6778		PO#

✓ all applicable boxes

Analysis

US EPA: ☑ Method 25 ☐ Method 3-C ☐ Method 25-C (NMOC as C [default]) ☐ Method 10-B ☐ Mod. M 3-C GHG/CO ☐ Mod. M25 Methane/Ethane

# of Tank & Trap Samples: 6	# of Tank-Only Samples:	# of Trap-Only Samples:	# of Bag Samples:
☐ Audit with Delay (*extra charge*)	☐ Rush Turnaround (*extra charge*)	☑ High Concentrations Possible ☐ Call if Concentrations High	☐ Dilute High Concentrations (*extra charge*)

Special Instructions:

Tanks for Analysis (Bags) (List IDs): ~~IN-2~~ 114, ~~IN-3~~ 6183 ~~OUT-3~~ OUT-5, ~~OUT-3~~ 176 IN-3, ~~OUT-1~~ 6182, ~~IN-1~~ 207, ~~OUT-2~~ 6102

Traps for Analysis (List IDs): ~~IN-3~~ XA, ~~OUT-3~~ ALH, ~~IN-1~~ AJS, ~~OUT-1~~ HE, ~~IN-2~~ IK, ~~OUT-2~~ ALX

☐ TES Equipment	☐ Client Equipment	☐ Client Equipment to be Reconditioned
Tanks, Unused for Reconditioning (List IDs): 6149, 155		Traps, Unused for Reconditioning (List IDs): NE, ALC

Relinquished by: J. JARDIN		Date: 12-4-14	Time: 1200	To: (Carrier)				
Tanks received at TES by:	Condition:	Date:	Time:	Traps received at TES by: Wayne Stutt	Condition: Good	Date: 12-5-14	Time: 12:15	

Appendix I

L&RR FACILITY DATA

DATE	TIME	FLOW SCFM	STACK OUTPUT TEMP DEG.F	TANK LEVEL 2-184"	HIGH FLARE TEMP DEG.F
12/2/2014	1100	405	1515	29	832
12/2/2014	1115	408	1570	29	922
12/2/2014	1130	411	1634	29	955
12/2/2014	1145	410	1594	29	880
12/2/2014	1200	410	1511	29	830
12/2/2014	1215	410	1595	29	900
12/2/2014	1230	410	1661	29	923
12/2/2014	1245	410	1621	29	950
12/2/2014	1300	410	1606	29	940
12/2/2014	1315	410	1639	28	894
12/2/2014	1330	410	1525	28	821
12/2/2014	1345	410	1530	29	835
12/2/2014	1400	410	1550	29	845
12/2/2014	1415	411	1600	29	850
12/2/2014	1430	411	1693	28	867
12/2/2014	1515	412	1660	28	905
12/2/2014	1530	411	1650	28	950
12/2/2014	1545	412	1660	28	965
12/2/2014	1600	411	1683	28	971
12/2/2014	1615	410	1700	28	973
12/2/2014	1630	410	1710	28	895
12/2/2014	1645	411	1590	27	850
12/2/2014	1700	410	1570	28	833
12/2/2014	1715	412	1541	29	836
12/2/2014	1730	410	1534	28	908
12/2/2014	1745	410	1568	29	918
12/2/2014	1800	410	1649	28	865

L&RR FACILITY DATA

DATE	TIME	FLOW SCFM	STACK OUTPUT TEMP DEG.F	TANK LEVEL 2-184"	HIGH FLARE TEMP DEG.F
12/3/2014	900	418	1536	20	812
12/3/2014	915	414	1520	21	811
12/3/2014	930	416	1550	21	815
12/3/2014	945	418	1510	21	812
12/3/2014	1000	418	1515	21	810
12/3/2014	1015	418	1595	20	930
12/3/2014	1030	419	1681	19	936
12/3/2014	1045	419	1519	20	832
12/3/2014	1100	419	1680	18	944
12/3/2014	1115	418	1600	17	890
12/3/2014	1130	420	1515	17	900
12/3/2014	1145	420	1580	17	910
12/3/2014	1200	418	1667	16	925
12/3/2014	1215	420	1557	17	865
12/3/2014	1230	421	1670	16	943
12/3/2014	1245	420	1528	16	852
12/3/2014	1300	420	1595	15	845
12/3/2014	1315	419	1550	16	880
12/3/2014	1330	418	1600	15	900
12/3/2014	1345	420	1666	14	916
12/3/2014	1400	419	1595	15	908
12/3/2014	1415	421	1532	15	883
12/3/2014	1430	420	1550	15	905

Device Name	Harrisville LLR Landfill
Device ESN	FXA-1229
Report Type	Report of Analog Input Values
Report Start	12/1/2014
Report End	12/3/2014
Records Reported	Up to 500

datetime	Flow Rate SCFM	Inlet Temperature *F
	SCFM	*F
12/1/2014 0:02	0	0
12/1/2014 0:12	0	0
12/1/2014 0:22	0	0
12/1/2014 0:32	0	0
12/1/2014 0:42	0	0
12/1/2014 0:52	0	0
12/1/2014 1:02	0	0
12/1/2014 1:12	0	0
12/1/2014 1:22	0	0
12/1/2014 1:32	0	0
12/1/2014 1:42	0	0
12/1/2014 1:52	0	0
12/1/2014 2:02	0	0
12/1/2014 2:12	0	0
12/1/2014 2:22	0	0
12/1/2014 2:32	0	0
12/1/2014 2:42	0	0
12/1/2014 2:52	0	0
12/1/2014 3:02	0	0
12/1/2014 3:12	0	0
12/1/2014 3:22	0	0
12/1/2014 3:33	0	0
12/1/2014 3:43	0	0
12/1/2014 3:53	0	0
12/1/2014 4:03	0	0
12/1/2014 4:13	0	0
12/1/2014 4:23	0	0
12/1/2014 4:33	0	0
12/1/2014 4:43	0	0
12/1/2014 4:53	0	0
12/1/2014 5:03	0	0
12/1/2014 5:13	0	0
12/1/2014 5:23	0	0
12/1/2014 5:33	0	0
12/1/2014 5:43	0	0
12/1/2014 5:53	0	0

12/1/2014 6:03	0	0
12/1/2014 6:13	0	0
12/1/2014 6:23	0	0
12/1/2014 6:33	0	0
12/1/2014 6:43	0	0
12/1/2014 6:53	0	0
12/1/2014 7:03	0	0
12/1/2014 7:13	0	0
12/1/2014 7:23	0	0
12/1/2014 7:33	0	0
12/1/2014 7:43	0	0
12/1/2014 7:53	0	0
12/1/2014 8:03	0	0
12/1/2014 8:13	0	0
12/1/2014 8:23	0	0
12/1/2014 8:33	0	0.742889222
12/1/2014 8:43	0	2.056511976
12/1/2014 8:53	0	3.370134731
12/1/2014 9:03	0	5.492140719
12/1/2014 9:13	0	7.668918919
12/1/2014 9:23	0	10.10135135
12/1/2014 9:33	0	12.88851351
12/1/2014 9:43	0	15.52364865
12/1/2014 9:53	0	17.95608108
12/1/2014 9:53	0	17.95608108
12/1/2014 10:03	0	20.23648649
12/1/2014 10:14	0	22.71959459
12/1/2014 10:24	0	25.2027027
12/1/2014 10:34	0	27.38175676
12/1/2014 10:44	0	28.75
12/1/2014 10:54	0	29.30743243
12/1/2014 11:04	0	30.06756757
12/1/2014 11:14	0	30.32094595
12/1/2014 11:24	0	31.79054054
12/1/2014 11:34	0	33.10810811
12/1/2014 11:44	0	34.62837838
12/1/2014 11:54	0	36.14864865
12/1/2014 12:04	0	37.11148649
12/1/2014 12:14	0	37.82094595
12/1/2014 12:23	0	37.9222973
12/1/2014 12:23	0	37.97297297
12/1/2014 12:24	0	38.02364865
12/1/2014 12:24	125.475942	38.27702703
12/1/2014 12:27	452.427078	1440.204387
12/1/2014 12:29	443.271402	2097.347543
12/1/2014 12:29	323.942112	2097.916249
12/1/2014 12:29	62.290317	2097.956871

12/1/2014 12:30	48.7073368	2097.550652
12/1/2014 12:34	0	1836.029742
12/1/2014 12:37	0	1404.620513
12/1/2014 12:44	0	911.0103917
12/1/2014 12:54	0	559.7398952
12/1/2014 13:04	0	356.0433242
12/1/2014 13:14	0	237.4476048
12/1/2014 13:24	0	174.3937126
12/1/2014 13:34	0	136.1976048
12/1/2014 13:44	0	110.5819611
12/1/2014 13:54	0	95.33783784
12/1/2014 14:00	0	1152.63555
12/1/2014 14:01	0	1578.462181
12/1/2014 14:01	0	1774.086308
12/1/2014 14:04	0	82.66891892
12/1/2014 14:14	0	73.24324324
12/1/2014 14:24	0	66.14864865
12/1/2014 14:34	0	60.8277027
12/1/2014 14:44	0	57.58445946
12/1/2014 14:54	0	54.18918919
12/1/2014 15:04	0	50.23648649
12/1/2014 15:14	0	44.96621622
12/1/2014 15:19	0	0
12/1/2014 15:24	0	0
12/1/2014 15:31	272.829412	0
12/1/2014 15:31	263.630544	0
12/1/2014 15:34	0	38.37837838
12/1/2014 15:35	0	0
12/1/2014 15:38	261.117451	0
12/1/2014 15:38	221.872608	0
12/1/2014 15:39	0	0
12/1/2014 15:44	0	0
12/1/2014 15:52	304.598699	0
12/1/2014 15:52	237.293823	0
12/1/2014 15:54	0	33.10810811
12/1/2014 16:04	0	26.92567568
12/1/2014 16:14	0	25
12/1/2014 16:24	0	21.75675676
12/1/2014 16:34	0	18.20945946
12/1/2014 16:34	0	18.20945946
12/1/2014 16:34	0	18.15878378
12/1/2014 16:34	375.033007	19.67905405
12/1/2014 16:37	446.680938	1451.258101
12/1/2014 16:44	432.232137	1514.299601
12/1/2014 16:55	428.917973	1656.257479
12/1/2014 17:05	428.202686	1669.635645
12/1/2014 17:15	427.439713	1659.084563

12/1/2014 17:25	422.528074	1643.232698
12/1/2014 17:35	425.293851	1614.810406
12/1/2014 17:45	423.076461	1615.517177
12/1/2014 17:55	421.645887	1634.246609
12/1/2014 18:05	419.428497	1666.65711
12/1/2014 18:15	419.643083	1672.159827
12/1/2014 18:25	420.286841	1673.623853
12/1/2014 18:35	418.999324	1660.599073
12/1/2014 18:45	418.641681	1653.430395
12/1/2014 18:55	418.212508	1654.793453
12/1/2014 19:05	416.567348	1640.859967
12/1/2014 19:15	416.305076	1629.299212
12/1/2014 19:25	416.400448	1606.783506
12/1/2014 19:35	416.567348	1610.620263
12/1/2014 19:45	415.899747	1622.382953
12/1/2014 19:55	415.661318	1637.124177
12/1/2014 20:05	413.372399	1650.502343
12/1/2014 20:15	414.826816	1672.412246
12/1/2014 20:25	414.588387	1686.345732
12/1/2014 20:35	414.2069	1688.869914
12/1/2014 20:45	413.563142	1686.901052
12/1/2014 20:55	415.542103	1704.368393
12/1/2014 21:05	412.776326	1699.673414
12/1/2014 21:15	412.418682	1677.359643
12/1/2014 21:25	412.585583	1690.283456
12/1/2014 21:35	411.107323	1666.000823
12/1/2014 21:45	412.919383	1653.531362
12/1/2014 21:55	411.298066	1645.60543
12/1/2014 22:05	411.131166	1648.331547
12/1/2014 22:15	410.964265	1626.21971
12/1/2014 22:25	410.368193	1615.618144
12/1/2014 22:35	410.272821	1597.595483
12/1/2014 22:45	410.868894	1594.263562
12/1/2014 22:55	410.701993	1593.354856
12/1/2014 23:05	408.126959	1585.479408
12/1/2014 23:15	409.652905	1554.987286
12/1/2014 23:25	409.676748	1534.743344
12/1/2014 23:36	409.533691	1519.044118
12/1/2014 23:46	408.603818	1501.984048
12/1/2014 23:56	407.864688	1498.652792
12/2/2014 0:06	407.292458	1514.299601
12/2/2014 0:16	407.936216	1504.002991
12/2/2014 0:26	408.055431	1504.154412
12/2/2014 0:36	407.72163	1504.103938
12/2/2014 0:46	407.006343	1504.5582
12/2/2014 0:56	407.72163	1503.70015
12/2/2014 1:06	407.912373	1505.719093

12/2/2014 1:16	407.602416	1504.255359
12/2/2014 1:26	408.222331	1503.548729
12/2/2014 1:36	407.697787	1503.094467
12/2/2014 1:46	405.528083	1520.507851
12/2/2014 1:56	406.41027	1530.95707
12/2/2014 2:06	406.219527	1525.201935
12/2/2014 2:16	405.50424	1528.18047
12/2/2014 2:26	406.744071	1536.257853
12/2/2014 2:36	406.219527	1547.919575
12/2/2014 2:46	406.052627	1566.295622
12/2/2014 2:56	405.67114	1585.630859
12/2/2014 3:06	406.028784	1609.863009
12/2/2014 3:16	404.645895	1617.385072
12/2/2014 3:26	406.171841	1634.145642
12/2/2014 3:36	405.480397	1661.204876
12/2/2014 3:46	405.289654	1697.603585
12/2/2014 3:56	405.003539	1688.869914
12/2/2014 4:06	405.265811	1681.852687
12/2/2014 4:16	405.861883	1687.15347
12/2/2014 4:26	404.836639	1684.93219
12/2/2014 4:36	406.147998	1681.398335
12/2/2014 4:46	404.812796	1667.313397
12/2/2014 4:56	405.575769	1642.021091
12/2/2014 5:06	404.622052	1641.819156
12/2/2014 5:16	404.622052	1616.375399
12/2/2014 5:26	405.551926	1588.256008
12/2/2014 5:36	405.289654	1568.718837
12/2/2014 5:46	403.525279	1538.327682
12/2/2014 5:56	404.622052	1532.824965
12/2/2014 6:06	405.289654	1525.55532
12/2/2014 6:16	404.550524	1517.933699
12/2/2014 6:27	404.550524	1525.908706
12/2/2014 6:37	402.953049	1560.59097
12/2/2014 6:47	403.310693	1594.011144
12/2/2014 6:57	403.215321	1636.114504
12/2/2014 7:07	402.333133	1663.224222
12/2/2014 7:17	402.953049	1670.241449
12/2/2014 7:27	403.978294	1677.713029
12/2/2014 7:37	402.857677	1690.081522
12/2/2014 7:47	403.334535	1692.757155
12/2/2014 7:57	403.835236	1690.687325
12/2/2014 8:07	403.811394	1689.526202
12/2/2014 8:17	403.382221	1684.730255
12/2/2014 8:27	403.477593	1671.907409
12/2/2014 8:37	403.644493	1653.682813
12/2/2014 8:47	404.073666	1634.902897
12/2/2014 8:57	404.502838	1628.188572

12/2/2014 9:07	405.051225	1613.194929
12/2/2014 9:17	404.908167	1597.999352
12/2/2014 9:27	404.622052	1577.856377
12/2/2014 9:37	405.432711	1568.567386
12/2/2014 9:47	404.741267	1548.929248
12/2/2014 9:57	404.455152	1530.906587
12/2/2014 10:07	405.647297	1518.842223
12/2/2014 10:17	405.480397	1508.697034
12/2/2014 10:27	405.385025	1511.32166
12/2/2014 10:37	404.478995	1529.341594
12/2/2014 10:47	406.004941	1530.755136
12/2/2014 10:57	405.957255	1538.731552
12/2/2014 11:07	407.387829	1539.185904
12/2/2014 11:17	406.195684	1559.48033
12/2/2014 11:27	407.745473	1585.580375
12/2/2014 11:37	408.031588	1602.340945
12/2/2014 11:47	407.220929	1626.320677
12/2/2014 11:57	407.244772	1666.354208
12/2/2014 12:07	407.316301	1689.273783
12/2/2014 12:17	408.126959	1693.867795
12/2/2014 12:27	408.842247	1700.58212
12/2/2014 12:37	407.55473	1695.786174
12/2/2014 12:47	409.342948	1698.007454
12/2/2014 12:58	408.723032	1689.071849
12/2/2014 13:08	409.342948	1674.229657
12/2/2014 13:18	408.484603	1669.736612
12/2/2014 13:28	408.270017	1654.793453
12/2/2014 13:38	408.675346	1651.814918
12/2/2014 13:48	409.462162	1652.370238
12/2/2014 13:58	408.985304	1614.608471
12/2/2014 14:08	409.414476	1580.885396
12/2/2014 14:18	408.413074	1543.729433
12/2/2014 14:28	408.675346	1525.100967
12/2/2014 14:38	409.795963	1518.640329
12/2/2014 14:48	408.985304	1508.192298
12/2/2014 14:58	409.676748	1505.163883
12/2/2014 15:08	410.129764	1504.457253
12/2/2014 15:18	410.892736	1494.564432
12/2/2014 15:28	410.129764	1496.734796
12/2/2014 15:38	409.676748	1504.810568
12/2/2014 15:48	407.340144	1508.898928
12/2/2014 15:58	408.150802	1533.986089
12/2/2014 16:08	409.366791	1536.308337
12/2/2014 16:18	410.177449	1536.156886
12/2/2014 16:28	409.128361	1543.123629
12/2/2014 16:38	410.082078	1550.746659
12/2/2014 16:48	410.201292	1548.626346

12/2/2014 16:58	410.010549	1555.088253
12/2/2014 17:08	411.178851	1566.699491
12/2/2014 17:18	408.484603	1583.258127
12/2/2014 17:28	410.535093	1596.383875
12/2/2014 17:38	409.056833	1606.985441
12/2/2014 17:48	409.19989	1613.34638
12/2/2014 17:58	409.486005	1617.536523
12/2/2014 18:08	407.602416	1622.48392
12/2/2014 18:18	409.60522	1623.544077
12/2/2014 18:28	409.724434	1627.481801
12/2/2014 18:38	410.535093	1636.770792
12/2/2014 18:48	408.270017	1644.747208
12/2/2014 18:58	409.795963	1643.081248
12/2/2014 19:08	408.889932	1653.581846
12/2/2014 19:18	411.274223	1652.218787
12/2/2014 19:28	410.606622	1668.878391
12/2/2014 19:39	410.463564	1670.241449
12/2/2014 19:49	410.988108	1674.280141
12/2/2014 19:59	410.463564	1672.361762
12/2/2014 20:09	413.658514	1674.229657
12/2/2014 20:19	409.652905	1674.482075
12/2/2014 20:29	410.201292	1669.938547
12/2/2014 20:39	410.725836	1682.408008
12/2/2014 20:49	412.347154	1686.295248
12/2/2014 20:59	410.296664	1695.533755
12/2/2014 21:09	411.155008	1697.654069
12/2/2014 21:19	412.013353	1696.84633
12/2/2014 21:29	412.227939	1698.91616
12/2/2014 21:39	411.202694	1702.752917
12/2/2014 21:49	413.563142	1706.185805
12/2/2014 21:59	414.516858	1712.799162
12/2/2014 22:09	413.420084	1713.909803
12/2/2014 22:19	414.707601	1690.939744
12/2/2014 22:29	415.446731	1712.041908
12/2/2014 22:39	414.588387	1707.64983
12/2/2014 22:49	415.136774	1709.517725
12/2/2014 22:59	414.850659	1713.102064
12/2/2014 23:09	416.281233	1697.80552
12/2/2014 23:20	415.422889	1695.533755
12/2/2014 23:30	414.421486	1690.33394
12/2/2014 23:40	416.543505	1683.670099
12/2/2014 23:50	416.66272	1688.819431
12/3/2014 0:00	417.354164	1691.040711
12/3/2014 0:10	418.212508	1698.108421
12/3/2014 0:20	416.185861	1701.086957
12/3/2014 0:30	417.425693	1680.691564
12/3/2014 0:40	417.330321	1677.763512

12/3/2014 0:50	417.449535	1679.681891
12/3/2014 1:00	419.333125	1685.083641
12/3/2014 1:12	418.88011	1673.674337
12/3/2014 1:12	417.783336	1640.355131
12/3/2014 1:22	418.975481	1641.566738
12/3/2014 1:32	416.495819	1649.290736
12/3/2014 1:42	417.258792	1639.64836
12/3/2014 1:52	418.212508	1627.229383
12/3/2014 2:02	418.546309	1636.215472
12/3/2014 2:12	419.428497	1641.415287
12/3/2014 2:22	419.237753	1657.872956
12/3/2014 2:32	418.617838	1660.548589
12/3/2014 2:42	417.997922	1664.940666
12/3/2014 2:52	417.854865	1665.748404
12/3/2014 3:02	418.975481	1683.720582
12/3/2014 3:12	419.78614	1685.891379
12/3/2014 3:22	419.881512	1674.12869
12/3/2014 3:32	419.690769	1668.575489
12/3/2014 3:42	420.739856	1644.595757
12/3/2014 3:52	420.143784	1637.174661
12/3/2014 4:02	420.239155	1622.837306
12/3/2014 4:12	419.356968	1628.087605
12/3/2014 4:22	419.857669	1618.849098
12/3/2014 4:32	419.881512	1604.006906
12/3/2014 4:42	419.738454	1592.597602
12/3/2014 4:52	419.833826	1572.000274
12/3/2014 5:02	418.403252	1560.439519
12/3/2014 5:13	418.355566	1550.948594
12/3/2014 5:23	417.950236	1541.154767
12/3/2014 5:33	418.903953	1540.750897
12/3/2014 5:43	419.45234	1531.108521
12/3/2014 5:53	417.73565	1520.558325
12/3/2014 6:03	418.689367	1520.053589
12/3/2014 6:13	418.546309	1512.5835
12/3/2014 6:23	416.114333	1511.018819
12/3/2014 6:33	417.616436	1513.037762
12/3/2014 6:43	417.592593	1508.949402
12/3/2014 6:53	417.306478	1512.331132
12/3/2014 7:03	417.068049	1504.103938
12/3/2014 7:13	417.163421	1502.690678
12/3/2014 7:23	417.807179	1501.479312
12/3/2014 7:33	418.188666	1502.387836
12/3/2014 7:43	417.163421	1504.760095
12/3/2014 7:53	416.042804	1505.719093
12/3/2014 8:03	416.901149	1509.555085
12/3/2014 8:13	415.613632	1511.220713
12/3/2014 8:23	416.615034	1513.340603

12/3/2014 8:33	417.687965	1515.763335
12/3/2014 8:43	416.448133	1509.857926
12/3/2014 8:53	416.09049	1510.211241
12/3/2014 9:03	416.853463	1513.744392
12/3/2014 9:13	416.448133	1507.031406
12/3/2014 9:23	416.328919	1505.163883
12/3/2014 9:33	416.99652	1506.476196
12/3/2014 9:43	416.209704	1514.955758
12/3/2014 9:53	416.400448	1521.063061
12/3/2014 10:03	416.281233	1521.820165
12/3/2014 10:13	417.211106	1541.104283
12/3/2014 10:23	417.449535	1557.511468
12/3/2014 10:33	417.330321	1567.557713
12/3/2014 10:43	417.807179	1585.126022
12/3/2014 10:53	417.163421	1610.115427
12/3/2014 11:03	417.258792	1624.402299
12/3/2014 11:13	417.163421	1639.093039
12/3/2014 11:23	418.617838	1628.895343
12/3/2014 11:33	418.689367	1635.609668
12/3/2014 11:43	417.664122	1630.460336
12/3/2014 11:54	418.212508	1621.726665
12/3/2014 12:04	418.760895	1646.261717
12/3/2014 12:14	418.903953	1664.587281
12/3/2014 12:24	419.023167	1680.237211
12/3/2014 12:34	418.760895	1693.665861
12/3/2014 12:44	417.521064	1680.439145
12/3/2014 12:54	417.878708	1678.116898
12/3/2014 13:04	418.760895	1673.068533
12/3/2014 13:15	419.333125	1683.013811
12/3/2014 13:25	419.04701	1682.054622
12/3/2014 13:35	418.927796	1678.874152
12/3/2014 13:46	418.760895	1682.357524
12/3/2014 13:56	418.903953	1679.479956
12/3/2014 14:06	418.737052	1684.730255
12/3/2014 14:16	419.762297	1680.287694
12/3/2014 14:26	418.427095	1645.252044
12/3/2014 14:36	418.856267	1602.088527
12/3/2014 14:46	419.070853	1567.052877
12/3/2014 14:56	419.61924	1557.81437
12/3/2014 15:06	417.807179	1552.160201
12/3/2014 15:17	418.069451	1618.950065
12/3/2014 15:18	417.40185	1648.634449
12/3/2014 15:28	417.759493	1611.781387
12/3/2014 15:38	416.686563	1594.465497
12/3/2014 15:48	416.924992	1569.526576
12/3/2014 15:58	415.709003	1572.707045
12/3/2014 16:08	415.899747	1552.665038

12/3/2014 16:18	417.139578	1522.17348
12/3/2014 16:28	416.400448	1519.649801
12/3/2014 16:38	414.898345	1519.397433
12/3/2014 16:48	414.683758	1508.999875
12/3/2014 16:58	415.732846	1510.816924
12/3/2014 17:08	416.09049	1539.034454
12/3/2014 17:19	415.041402	1528.029019
12/3/2014 17:29	414.850659	1539.488806
12/3/2014 17:39	413.253184	1557.410501
12/3/2014 17:49	413.8731	1579.320403
12/3/2014 17:59	414.493015	1606.985441
12/3/2014 18:09	414.826816	1628.794376
12/3/2014 18:18	414.2069	1652.622657
12/3/2014 18:28	412.752483	1668.373554
12/3/2014 18:38	413.849257	1677.410127
12/3/2014 18:48	412.370997	1699.067611
12/3/2014 18:59	412.752483	1698.91616
12/3/2014 19:09	412.490211	1695.432788
12/3/2014 19:19	412.227939	1697.80552
12/3/2014 19:29	410.225135	1695.685206
12/3/2014 19:39	412.037196	1705.125648
12/3/2014 19:49	409.557534	1708.356602
12/3/2014 19:59	410.225135	1718.049462
12/3/2014 20:09	408.937618	1676.400454
12/3/2014 20:19	408.222331	1674.532559
12/3/2014 20:29	408.365389	1665.950339
12/3/2014 20:39	407.745473	1642.677378
12/3/2014 20:49	407.983902	1631.06614
12/3/2014 20:59	408.055431	1594.51598
12/3/2014 21:09	407.220929	1578.159279
12/3/2014 21:19	406.028784	1551.806816
12/3/2014 21:29	406.24337	1536.611239
12/3/2014 21:39	405.551926	1515.056705
12/3/2014 21:49	406.481799	1506.829511
12/3/2014 21:59	405.003539	1500.772682
12/3/2014 22:09	405.456554	1505.920987
12/3/2014 22:19	404.741267	1511.977817
12/3/2014 22:29	405.146596	1540.145094
12/3/2014 22:39	404.049823	1568.163517
12/3/2014 22:49	403.835236	1607.742695
12/3/2014 22:59	402.929206	1628.239056
12/3/2014 23:09	402.833834	1657.872956
12/3/2014 23:19	402.571563	1679.732374
12/3/2014 23:29	401.880118	1692.252319
12/3/2014 23:39	402.428505	1702.096629
12/3/2014 23:49	403.048421	1692.908606
12/3/2014 23:59	403.239164	1689.071849

Appendix J

NOZZLE CALIBRATION DATA

FACILITY: LARC LANDFILL DATE: 12/2/14

NOZZLE ID: Quartz

DIAMETER #	INSIDE DIAMETER (in)
1	0.750
2	0.750
3	0.751
AVERAGE	0.750

NOZZLE ID: Quartz

DIAMETER #	INSIDE DIAMETER (in)
1	0.689
2	0.690
3	0.690
AVERAGE	0.690

NOZZLE ID: Quartz

DIAMETER #	INSIDE DIAMETER (in)
1	0.749
2	0.750
3	0.750
AVERAGE	0.750

NOTE: The difference between inside diameters shall not exceed 0.004 inches

NOZZLE CALIBRATION DATA

FACILITY: L&RR LANDFILL DATE: 12/2/14

NOZZLE ID: _____

DIAMETER #	INSIDE DIAMETER (in)
1	.655
2	.656
3	.655
AVERAGE	.655

NOZZLE ID: _____

DIAMETER #	INSIDE DIAMETER (in)
1	
2	
3	
AVERAGE	

NOZZLE ID: _____

DIAMETER #	INSIDE DIAMETER (in)
1	
2	
3	
AVERAGE	

NOTE: The difference between inside diameters shall not exceed 0.004 inches

METHOD 5 PRE-TEST CONSOLE CALIBRATION
USING CALIBRATED CRITICAL ORIFICES
6-POINT ENGLISH UNITS

Meter Console Information	
Console Model Number	MB-2
Console Serial Number	MB-2
DGM Model Number	175
DGM Serial Number	MB2-175

Calibration Conditions		
Date	Time	25-Nov-14 10:30
Barometric Pressure		29.89 in Hg
Theoretical Critical Vacuum[1]		14.11 in Hg
Calibration Technician		CS

Factors/Conversions		
Std Temp	528	R
Std Press	29.92	in Hg
K'	17.647	uH=in Hg

[1]For valid test results, the Actual Vacuum should be 1 to 2 in. Hg greater than the Theoretical Critical Vacuum shown above.

[2]The Critical Orifice Coefficient, K', must be entered in English units, $(ft^3*R^{.5})/(in.Hg*min)$.

Calibration Data

Run Time	Metering Console						Critical Orifice			
Elapsed	DGM Orifice dH	Volume Initial	Volume Final	Outlet Temp Initial	Outlet Temp Final	Serial Number	Coefficient	Amb Temp Initial	Amb Temp Final	Actual Vacuum
θ	ΔH	V_{mi}	V_{mf}	t_{mi}	t_{mf}		K'	t_{ai}	t_{af}	
min	in H_2O	cubic feet	cubic feet	°C	°C		(ft3*R0.5)/(in.Hg*min)	°F	°F	in Hg
10.0	0.34	163.100	166.441	67	69	1	0.2508	63	63	19
10.0	0.93	167.000	172.319	69	70	2	0.4114	63	63	18
10.0	1.50	172.700	179.850	70	71	3	0.6602	64	65	17
10.0	2.30	180.200	188.875	72	73	4	0.6660	65	65	16
10.0	3.50	189.600	200.300	73	74	5	0.8269	66	65	15
10.0	4.00	201.100	212.576	74	76	6	0.8809	66	66	14

Results

Standard Data						Dry Gas Meter		
Dry Gas Meter		Critical Orifice		Calibration Factor		Flowrate	$\Delta H @$	
Vm(std)	Q	Vm(std)	Q	Value	Variation	Std & Corr	0.75 SCFM	Variation
cubic feet	cfm	cubic feet	cfm	Y	dY	Qstd=Qcorr	dH=dH@	dH-dH@
						cfm	in H2O	
3.340	0.334	3.398	0.340	1.0168	0.007	0.340	1.661	0.002
5.309	0.531	5.377	0.538	1.0127	0.003	0.538	1.697	-0.062
7.135	0.714	7.181	0.718	1.0064	-0.003	0.718	1.640	-0.019
8.640	0.864	8.688	0.869	1.0056	-0.004	0.869	1.643	-0.016
10.670	1.067	10.807	1.081	1.0128	0.003	1.081	1.697	0.038
11.426	1.143	11.460	1.148	1.0048	-0.005	1.148	1.718	0.059
				1.0099	Y Average		1.659	dH Average

Note: For Calibration Factor Y, the ratio of the reading of the calibration meter to the dry gas meter, acceptable tolerance of individual values from the average is +-0.02

I certify that the above Dry Gas Meter was calibrated in accordance with USEPA Methods, CFR 40 Part 60, using the Precision Wet Test Meter # 11ASE which in turn was calibrated using the American Bell Prover # 3795, certificate # F107, which is traceable to the National Bureau of Standards (NIST).

Signature _____ Date _____

METHOD 5 POST-TEST CONSOLE CALIBRATION
USING CALIBRATED CRITICAL ORIFICES
3-POINT ENGLISH UNITS

Meter Console Information	
Console Model Number	MB-2
Console Serial Number	MB-2
DGM Model Number	DGM-175
DGM Serial Number	MB-2-175

Calibration Conditions			
Date	Time	26-Jan-15	15:00
Barometric Pressure		30.0	in Hg
Theoretical Critical Vacuum[1]		14.2	in Hg
Calibration Technician		C.S.	

Factors/Conversions		
Std Temp	528	°R
Std Press	29.92	in Hg
K_1	17.647	°R/in Hg

[1]For valid test results, the Actual Vacuum should be 1 to 2 in. Hg greater than the Theoretical Critical Vacuum shown above.

[2]The Critical Orifice Coefficient, K', must be entered in English units, $(ft^3)(°R)^{1/2}/(in.Hg)(min)$.

Calibration Data

Run Time	Metering Console					Critical Orifice				
Elapsed	DGM Orifice ΔH	Volume Initial	Volume Final	Outlet Temp Initial	Outlet Temp Final	Serial Number	Coefficient	Amb Temp Initial	Amb Temp Final	Actual Vacuum
θ	ΔH	V_{mi}	V_{mf}	T_{mi}	T_{mf}		K'	T_{amb}	T_{amb}	
min	in H_2O	cubic feet	cubic feet	°F	°F		$(ft^3)(°R)^{1/2}/(in.Hg)(min)$	°F	°F	in Hg
10.0	1.5	530.800	537.848	40	44	3	0.5502	54	53	15
10.0	1.5	537.800	544.730	45	49	3	0.5502	54	53	15
10.0	1.5	545.000	551.997	50	54	3	0.5502	53	51	15

Results

Standardized Data				Calibration Factor		Dry Gas Meter		
Dry Gas Meter		Critical Orifice		Value	Variation	Flowrate	ΔH @	
V_{mstd}	Q_{std}	V_{cr}	Q_{std}	Y	$Y_i - Y_a$	Std & Dry	0.75 SCFM	Variation
cubic feet	cfm	cubic feet	cfm			Q_{std}	ΔH	$\Delta H - \Delta H_a$
						cfm	in H_2O	
7.245	0.725	7.282	0.728	1.0049	0.001	0.728	1.691	0.018
7.261	0.726	7.282	0.728	1.0029	-0.001	0.728	1.675	0.002
7.259	0.726	7.292	0.729	1.0048	0.000	0.729	1.653	-0.020
				1.0041	Y Average		1.673	ΔH @ Average

Y Comparisons	
Y Previous	1.0015
Y Average	1.0041
% Diff. Allowed	5

Note: For Calibration Factor Y, the ratio of the reading of the calibration meter to the dry gas meter, acceptable tolerance of individual values from the average is +-0.02.

METHOD 5 PRE-TEST CONSOLE CALIBRATION
USING CALIBRATED CRITICAL ORIFICES
6 POINT ENGLISH UNITS

Meter Console Information	
Console Model Number	MB-3
Console Serial Number	MB-3
DGM Model Number	
DGM Serial Number	

Calibration Conditions			
Date	Time	24-Nov-14	12:30
Barometric Pressure		29.70	in Hg
Theoretical Critical Vacuum[1]		14.0	in Hg
Calibration Technician		CS	

Factors/Conversions		
Std Temp	528	°R
Std Press	29.92	in Hg
K'	17.647	°R/in Hg

[1]For valid test results, the Actual Vacuum should be 1 to 2 in. Hg greater than the Theoretical Critical Vacuum shown above.

[2]The Critical Orifice Coefficient, K', must be entered in English units, $(ft^3 * R^{.5})/(in.Hg * min)$.

Calibration Data

Run Time		Metering Console				Critical Orifice				
Elapsed	DGM Orifice ΔH	Volume Initial	Volume Final	Outlet Temp Initial	Outlet Temp Final	Serial Number	Coefficient	Amb Temp Initial	Amb Temp Final	Actual Vacuum
min	in H2O	cubic feet	cubic feet	°F	°F		see above[2]	°F	°F	in Hg
10.0	0.33	878.900	882.135	61	62	1	0.3566	64	64	19
10.0	0.83	882.900	888.172	63	64	2	0.4114	65	66	18
10.0	1.65	888.600	895.664	64	66	3	0.5502	66	67	17
10.0	2.40	896.200	904.698	67	68	4	0.6680	67	67	15
10.0	3.90	905.400	916.156	69	71	5	0.8388	66	67	14
10.0	4.30	918.900	928.365	71	73	6	0.8809	66	68	14

Results

Standardized Data				Calibration Factor		Dry Gas Meter Flowrate		ΔH @
Dry Gas Meter		Critical Orifice		Value	Variation	Std & Calc	0.75 SCFM	Variation
Volume	Volume	Volume	Volume	Y	dev	Standard	ΔH@	Deviation
cubic feet	cfm	cubic feet	cfm			cfm	in H2O	
3.354	0.335	3.371	0.337	1.0049	0.004	0.337	1.646	-0.156
5.299	0.529	5.330	0.533	1.0078	0.006	0.533	1.753	-0.050
7.051	0.708	7.122	0.712	1.0067	0.005	0.712	1.843	0.040
8.694	0.869	8.618	0.862	0.9911	-0.010	0.862	1.830	0.026
10.737	1.074	10.728	1.073	0.9992	-0.002	1.073	1.873	0.069
11.415	1.142	11.397	1.140	0.9984	-0.003	1.140	1.875	0.072
				1.0011	Y Average		1.803	ΔH@ Average

Note: For Calibration Factor Y, the ratio of the reading of the calibration meter to the dry gas meter, acceptable tolerance of individual values from the average is +-0.02

I certify that the above Dry Gas Meter was calibrated in accordance with USEPA Methods, CFR 40 Part 60, using the Precision Wet Test Meter # 11AEB, which in turn was calibrated using the American Bell Prover # 3765, certificate # F107, which is traceable to the National Bureau of Standards (N.I.S.T.).

Signature _____ Date _____

METHOD 5 POST-TEST CONSOLE CALIBRATION
USING CALIBRATED CRITICAL ORIFICES
3-POINT ENGLISH UNITS

Meter Console Information	
Console Model Number	MB-3
Console Serial Number	MB-3
DGM Model Number	
DGM Serial Number	

Calibration Conditions			
Date	Time	26-Jan-15	15:30
Barometric Pressure		29.99	in Hg
Theoretical Critical Vacuum[1]		14.2	in Hg
Calibration Technician		CS	

Factors/Conversions		
Std Temp	528	°R
Std Press	29.92	in Hg
K'	17.647	°R/in Hg

[1]For valid test results, the Actual Vacuum should be 1 to 2 in. Hg greater than the Theoretical Critical Vacuum shown above.

[2]The Critical Orifice Coefficient, K', must be entered in English units, ($ft^3 \cdot °R^{1/2}$/(in.Hg·min).

Calibration Data

Run Time	Metering Console					Critical Orifice				
Elapsed	DGM Orifice ΔH	Volume Initial	Volume Final	Outlet Temp Initial	Outlet Temp Final	Serial Number	Coefficient	Amb Temp Initial	Amb Temp Final	Actual Vacuum
min	in H_2O	cubic feet	cubic feet	°F	°F		sec·sqrt(K)	°F	°F	in Hg
10.0	1.7	441.800	448.905	51	53	3	0.5502	51	52	17
10.0	1.7	449.103	456.184	53	55	3	0.5502	52	53	17
10.0	1.7	456.300	463.409	55	57	3	0.5502	52	52	17

Results

Standardized Data				Dry Gas Meter			Y Comparisons	
Dry Gas Meter		Critical Orifice		Calibration Factor		Flowrate		Y Previous	1.0011
Vm(std)	Qstd	Vcr(std)	Qcr	Value	Variation	Std & Corr	ΔH@ 0.75 SCFM	Y Average	0.9938
cubic feet	cfm	cubic feet	cfm	Y	ΔY	cfm	in H2O	ΔH@	Variation
7.375	0.737	7.296	0.730	0.9883	-0.004	0.730	1.874	0.006	% Diff. Allowed	5
7.321	0.732	7.292	0.729	0.9960	0.002	0.729	1.868	0.001	
7.322	0.732	7.292	0.729	0.9960	0.002	0.729	1.861	-0.007	
				0.9938	Y Average		1.868	ΔH@ Average	

Note: For Calibration Factor Y, the ratio of the reading of the calibration meter to the dry gas meter, acceptable tolerance of individual values from the average is +-0.02.

Thermocouple Calibration Sheet

DATE: 1/29/2014
TECHNICIAN: CS

ALL READINGS IN DEGREES FARENHEIGHT

T.C. ID	ASSET NUMBER	ICE WATER	ACTUAL RESPONSE	BOILING WATER	ACTUAL RESPONSE	% DIFF LOW	% DIFF HIGH	RESULT
M5-3-1	0115	32.0	31.8	212.0	212.0	0.63	0.00	**PASS**
M5-3-2	0116	32.0	32.0	212.0	212.0	0.00	0.00	**PASS**
M5-3-3	0117	32.0	32.1	212.0	211.0	0.31	0.47	**PASS**
M5-3-4	0118	32.0	32.1	212.0	212.0	0.31	0.00	**PASS**
M5-5-1	0114	32.0	32.2	212.0	213.0	0.62	0.47	**PASS**
M5-5-2	0122	32.0	32.3	212.0	213.0	0.93	0.47	**PASS**
M5-6-1	0112	32.0	32.2	212.0	210.0	0.62	0.94	**PASS**
M5-7-2	0113	32.0	32.2	212.0	211.0	0.62	0.47	**PASS**
M5-7-3	0110	32.0	32.0	212.0	212.0	0.00	0.00	**PASS**
M5-7-4	0111	32.0	32.2	212.0	212.0	0.62	0.00	**PASS**
M5-7-HH	0134	32.0	32.3	212.0	212.0	0.93	0.00	**PASS**
M5INC-7-1	0123	32.0	32.2	212.0	212.0	0.62	0.00	**PASS**
M5INC-7-2	0124	32.0	32.3	212.0	211.0	0.93	0.47	**PASS**
M5-8-1	0108	32.0	32.1	212.0	212.0	0.31	0.00	**PASS**
M5-8-2	0109	32.0	32.1	212.0	212.0	0.31	0.00	**PASS**
M5-9-1	0107	32.0	32.0	212.0	212.0	0.00	0.00	**PASS**
M5-10-1	0106	32.0	32.4	212.0	213.0	1.23	0.47	**PASS**
M5-12-1	0130							
M5-13-1	0105							
M5-16-1	0131							
M5-16-2	0132	32.0	32.1	212.0	212.0	0.31	0.00	**PASS**
M5-16-3	0133	32.0	32.4	212.0	212.0	1.23	0.00	**PASS**
TF-7	0125	32.0	32.2	212.0	212.0	0.62	0.00	**PASS**
TF-TELE	0126							
TF-5	139	32.0	32.0	212.0	212.0	0.00	0.00	**PASS**
TF-10	-	32.0	32.2	212.0	213.0	0.62	0.47	**PASS**
TF-11-1	0135	32.0	32.1	212.0	211.0	0.31	0.47	**PASS**
M5INC-10-1		32.0	32.1	212.0	212.0	0.31	0.00	**PASS**

CEMSERVICES 360 Old Colony Road, Suite 1, Norton, MA 02766

Thermocouple Calibration Sheet

DATE: 5/18/2014
TECHNICIAN CS

ALL READINGS IN DEGREES FARENHEIGHT

Ser. #	T.C. ID	ICE WATER	ACTUAL RESPONSE	BOILING WATER	ACTUAL RESPONSE	% DIFF LOW	% DIFF HIGH	RESULT
501	IS-1	32.0	32.1	212	212	0.31	0.00	PASS
		32.0	32.2	212	212	0.62	0.00	PASS
2206	IS-2	32.0	32.1	212	212	0.31	0.00	PASS
		32.0	32.1	212	212	0.31	0.00	PASS
	OFFSET-1	32.0	32.2	212	213	0.62	0.47	PASS
		32.0	32.2	212	213	0.62	0.47	PASS
708	OFFSET-2	32.0	32.2	212	212	0.62	0.00	PASS
		32.0	32.2	212	213	0.62	0.47	PASS
	OFFSET-3	32.0	32.3	212	211	0.93	0.47	PASS
		32.0	32.3	212	212	0.93	0.00	PASS
183	OFFSET-4	32.0	32.0	212	211	0.00	0.47	PASS
		32.0	32.0	212	212	0.00	0.00	PASS
454	OFFSET-5	32.0	32.3	212	213	0.99	0.47	PASS
		32.0	32.4	212	213	1.23	0.47	PASS
459	OFFSET-6	32.0	32.2	212	211	0.62	0.47	PASS
		32.0	32.1	212	211	0.31	0.47	PASS
709	OFFSET-7	32.0	32.0	212	214	0.00	0.94	PASS
		32.0	32.0	212	214	0.00	0.94	PASS
	OFFSET-8	32.0	32.2	212	210	0.62	0.94	PASS
		32.0	32.2	212	211	0.62	0.47	PASS
	FH-1	32.0	32.0	212	210	0.00	0.94	PASS
		32.0	32.1	212	213	0.31	0.47	PASS
	FH-2	32.0	32.2	212	212	0.62	0.00	PASS
		32.0	32.3	212	213	0.93	0.47	PASS
	FH-3	32.0	32.3	212	211	0.93	0.47	PASS
		32.0	32.1	212	212	0.31	0.00	PASS
	GLASS-1	32.0	32.0	212	212	0.00	0.00	PASS
		32.0	32.0	212	212	0.00	0.00	PASS
	GLASS-2	32.0	32.1	212	212	0.31	0.00	PASS
		32.0	32.2	212	212	0.62	0.00	PASS
	GLASS-3	32.0	32.0	212	212	0.00	0.00	PASS
		32.0	32.1	212	211	0.31	0.47	PASS
	GLASS-4	32.0	32.2	212	213	0.62	0.47	PASS
		32.0	32.2	212	214	0.62	0.94	PASS
	VOST 1	32.0	32.0	212	212	0.00	0.00	PASS
		32.0	32.1	212	213	0.31	0.47	PASS
	VOST-2	32.0	32.0	212	211	0.00	0.47	PASS
		32.0	32.0	212	211	0.00	0.47	PASS
5122	OFFSET-9-SHORT	32.0	32.0	212	210	0.00	0.94	PASS
		32.0	32.0	212	211	0.00	0.47	PASS
5049	OFFSET-10-SHORT	32.0	32.2	212	212	0.62	0.00	PASS
		32.0	32.3	212	213	0.93	0.47	PASS
	GLASS-5-SHORT	32.0	32.1	212	212	0.31	0.00	PASS
		32.0	32.2	212	212	0.62	0.00	PASS
	GLASS-6-SHORT	32.0	31.9	212	211	0.31	0.47	PASS
		32.0	32.0	212	212	0.00	0.00	PASS
	LAB 10-1	32.0	32.1	212	212	0.31	0.00	PASS
		32.0	32.0	212	212	0.00	0.00	PASS

CEMSERVICES 360 Old Colony Road, Suite 1, Norton, MA 02766

Thermocouple Calibration Sheet

DATE: 1/28/2014
TECHNICIAN CS

ALL READINGS IN DEGREES FARENHEIGHT

T.C. ID	ASSET NUMBER	ICE WATER	ACTUAL RESPONSE	BOILING WATER	ACTUAL RESPONSE	% DIFF LOW	% DIFF HIGH	RESULT
FIA-1	0052	32.0	32.1	212	212	0.31	0.00	**PASS**
		32.0	32.1	212	212	0.31	0.00	**PASS**
FIA-2	0053	32.0	32.1	212	212	0.31	0.00	**PASS**
		32.0	32.2	212	213	0.62	0.47	**PASS**
FIA-3	0054	32.0	32.2	212	212	0.62	0.00	**PASS**
		32.0	32.0	212	212	0.00	0.00	**PASS**
FIA-4	0055	32.0	32.0	212	211	0.00	0.47	**PASS**
		32.0	32.2	212	211	0.62	0.47	**PASS**
FIA-5	0056	32.0	32.1	212	212	0.31	0.00	**PASS**
		32.0	32.0	212	213	0.00	0.47	**PASS**
FIA-6	0057	32.0	32.3	212	211	0.93	0.47	**PASS**
		32.0	32.4	212	212	1.23	0.00	**PASS**
MB-1	0001	32.0	32.0	212	212	0.00	0.00	**PASS**
DGM IN		32.0	32.1	212	212	0.31	0.00	**PASS**
MB-1		32.0	32.3	212	213	0.93	0.47	**PASS**
DGM OUT		32.0	32.3	212	213	0.93	0.47	**PASS**
MB-2	0002	32.0	32.1	212	211	0.31	0.47	**PASS**
DGM IN		32.0	32.1	212	212	0.31	0.00	**PASS**
MB-2		32.0	32.1	212	211	0.31	0.47	**PASS**
DGM OUT		32.0	32.0	212	211	0.00	0.47	**PASS**
MB-3	0003	32.0	32.0	212	213	0.00	0.47	**PASS**
DGM IN		32.0	32.0	212	212	0.00	0.00	**PASS**
MB-3		32.0	32.1	212	212	0.31	0.00	**PASS**
DGM OUT		32.0	31.9	212	211	0.31	0.47	**PASS**
MB-4	0004	32.0	31.9	212	211	0.31	0.47	**PASS**
DGM OUT		32.0	32.0	212	212	0.00	0.00	**PASS**
AUX		32.0	32.4	212	214	1.23	0.94	**PASS**
		32.0	32.4	212	213	1.23	0.47	**PASS**
TP-13-1	0140	32.0	31.9	212	212	0.31	0.00	**PASS**
		32.0	31.9	212	212	0.31	0.00	**PASS**
Coil TC	0142	32.0	31.9	212	212	0.31	0.00	**PASS**
		32.0	31.8	212	212	0.63	0.00	**PASS**

CEMS SERVICES
360 Old Colony Road, Suite 1, Norton, MA 02766

Appendix K

THE LINDE GROUP

Linde

SHIPPED TO: CEM Services
360 Old Colony Rd Ste 1
Norton, MA 02766

PAGE: 1 of 1

CERTIFICATE OF ANALYSIS

Sales#:	111842375	**Cylinder Size:**	2A (8" X 47.5")
Production#:	1304470	**Cylinder # :**	CC-19897
Certification Date:	Jul-29-2014	**Cylinder Pressure:**	2000 psig
P.O.# :	070714KM	**Cylinder Valve:**	CGA 580 / Brass
Blend Type:	ZERO NITROGEN	**Cylinder Volume:**	29.5 Liter
Material#:	24086370	**Cylinder Material:**	Aluminum
		Gas Volume:	4000 Liters

Do NOT use under: 150 psig

COMPONENT	REQUESTED GAS GRADE
NITROGEN	99.998 %

THC < 0.2 ppm

ANALYST: Justin Kutz

DATE: Jul-29-2014

THE LINDE GROUP Linde

CERTIFICATE OF ANALYSIS

EPA PROTOCOL MIXTURE

PROCEDURE # : G1

PGVP ID#:	I12013	**GAS CODE:**	OC2
CUSTOMER:	Cem Services	**CYLINDER # :**	CC-18310
SALES#:	110374941	**CYLINDER PRES:**	2000 PSIG
PROD#:	1257674	**CYLINDER VALVE:**	CGA 590
P.O.# :	050813KM	**CYLINDER SIZE:**	2A
MATERIAL#:	24086339	**CYLINDER MATERIAL:**	Aluminum
CERTIFICATION DATE:	28-May-2013	**GAS VOLUME:**	4000 Liter
EXPIRATION DATE:	29-May-2021	**BLEND TOLERANCE:**	5% Relative
(Using the May 2012 Revision of the EPA Protocol)		**PAGE:**	1 of 1

CERTIFICATION HISTORY

COMPONENT	DATE OF ASSAY	MEAN CONCENTRATION	CERTIFIED CONCENTRATION	ANALYTICAL ACCURACY
Carbon Dioxide	28-May-2013	19.85 %	19.85 %	+/- 1%
Oxygen	28-May-2013	22.7 %	22.7 %	+/- 1%

BALANCE Nitrogen

PREVIOUS CERTIFICATION DATES: None

REFERENCE STANDARDS

COMPONENT	SRM/NTRM#	CYLINDER#	CONCENTRATION
Carbon Dioxide	NTRM-82745x	SG-9609736	19.98 %
Oxygen	NTRM-82659Y	cc-237244	24.52 %

INSTRUMENTATION

COMPONENT	MAKE/MODEL	SERIAL #	DETECTOR	CALIBRATION DATE(S)
Carbon Dioxide	CAI-300	S03001	NDIR	10-May-2013
Oxygen	CAI-300	S03001	PM	24-May-2013

THIS STANDARD IS NIST TRACEABLE. IT WAS CERTIFIED ACCORDING TO THE 1997 EPA PROTOCOL PROCEDURES. DO NOT USE THIS STANDARD IF THE CYLINDER PRESSURE IS LESS THAN 100 PSIG.

ANALYST: _____ **DATE:** 28-May-2013

MATTHEW JACKSON

Linde Gas North America LLC

(908) 329-9700 Main (908) 329-9740 Fax
www.Lindeus.com

MAINE SPECIALTY GASES
PurityPlus

Maine Oxy
Spec-Air Specialty Gases
Auburn, ME

EPA Protocol Gas Mixture

Customer:	Maine Oxy/ Spec-Air	Reference#:	052314SY-J
CGA:	590	Certification Date:	05/29/2014
Customer PO#:	164363	Expiration Date:	05/29/2022
Cylinder #:	EB0056130	Pressure, psig:	2000

Method: This standard was analyzed according to EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards, Procedure G1 (May 2012).

Analyzed Cylinder-

Components	Certified Concentration	Expanded Uncertainty
Oxygen	11.34%	0.2%
Carbon Dioxide	9.86%	0.2%
Nitrogen	Balance	-

Reference Standard-

Type/SRM Sample	Cylinder #	Concentration
Oxygen/GMIS	EB0040572	9.96%
Carbon Dioxide/GMIS	CC33836	10.99%

Instrument-

Instrument/ Model	Serial Number	Last Date Calibrated	Analytical Method
Micro GC/MTI M200	170612	05/29/2014	TCD

These mixtures were prepared gravimetrically using a high load high sensitivity electronic scale. Prior to filling the scale is verified for accuracy throughout the target mass range against applicable NIST traceable weights. We certify that the weights are calibrated to ASTM E617-97 Echelon 1 tolerances.

The reported expanded uncertainty of measurement is stated as the combined standard uncertainty of measurement multiplied by the coverage factor k (k=2) such that the coverage probability corresponds to approximately 95 %.

This report states accurately the results of the investigation made upon the material submitted to the analytical laboratory. Every effort has been made to determine objectively the information requested. However, in connection with this report, Global Calibration Gases LLC shall have no liability in excess of the established charge for this service. Assayed at Global Calibration Gases LLC, Sarasota, Florida.

The calibration results published in this certificate were obtained using equipment and standards capable of producing results that are traceable to National Institute of Standards and Technology (NIST) and through NIST to the International System of Units (SI). The expanded uncertainties, if included on this certificate, use a coverage factor of k=2 to approximate the 95% confidence level of the measurement, unless otherwise noted. If uncertainties are not included on this certificate, they are available upon request. This calibration certificate applies only to the item described and shall not be reproduced other than in full, without written approval from the calibration facility. Calibration certificates without signatures are not valid. This calibration meets the requirements of ISO/IEC 17025-2005.

*Do not use this standard when cylinder pressure is below 150 psig.

Produced by: Global Calibration Gases LLC.
1090 Commerce Blvd N.
Sarasota, Florida 34243
PGVP Vendor ID.: N22014

GLOBAL CALIBRATION GASES LLC

Principal Analyst: [signature]
Date: 05/29/2014

Principal Reviewer: [signature]
Date: 5/29/2014

THE LINDE GROUP

CERTIFICATE OF ANALYSIS

EPA PROTOCOL MIXTURE

PROCEDURE # : G1

PGVP ID#:	I12014	**GAS CODE:**	SNC
CUSTOMER:	Cem Services	**CYLINDER # :**	CC-20172
SALES#:	111432929	**CYLINDER PRES:**	2000 PSIG
PROD#:	1290264	**CYLINDER VALVE:**	CGA 660
P.O.# :	030614KM	**CYLINDER SIZE:**	2A
MATERIAL#:	24086350	**CYLINDER MATERIAL:**	Aluminum
CERTIFICATION DATE:	01-Apr-2014	**GAS VOLUME:**	4000 Liters
EXPIRATION DATE:	02-Apr-2022	**BLEND TOLERANCE:**	5% Relative
		PAGE:	1 of 1

CERTIFICATION HISTORY

COMPONENT	DATE OF ASSAY	MEAN CONCENTRATION	CERTIFIED CONCENTRATION	UNCERTAINTY AT 95% CONFIDENCE
Nitric Oxide	20-Mar-2014 01-Apr-2014	94.75 ppm 94.829 ppm	94.79 ppm	± 0.79 ppm
NOx			94.87 ppm	Reference Value Only
Sulfur Dioxide	20-Mar-2014 01-Apr-2014	94.55 ppm 94.52 ppm	94.5 ppm	± 1.1 ppm
Carbon Monoxide	01-Apr-2014	94.81 ppm	94.81 ppm	± 0.65 ppm

BALANCE Nitrogen

PREVIOUS CERTIFICATION DATES: None

REFERENCE STANDARDS

COMPONENT	SRM/NTRM#	CYLINDER#	CONCENTRATION	EXPIRATION DATE
Nitric Oxide	NTRM-121001	CC-349555	95.20 ± 1.00 ppm	25-Apr-2015
Sulfur Dioxide	GMIS-277070 NTRM-041001	CC-65793 CC-143635	101.0 ± 1.3 ppm 96.1 ± 1.1 ppm	01-Oct-2014 17-Jan-2019
Carbon Monoxide	GMIS-278152 SRM 1679c 3-H-29	cc-88590 cal011876	96.85 ± 0.53 ppm 97.60 ± 0.50 ppm	25-Sep-2015 21-Jun-2015

INSTRUMENTATION

COMPONENT	MAKE/MODEL	SERIAL #	DETECTOR	CALIBRATION DATE(S)
Nitric Oxide	CAI 400-CLD	6L09004	Chemi	04-Mar-2014
Sulfur Dioxide	Horiba VIA-510	851221093	NDIR	05-Mar-2014
Carbon Monoxide	Horiba VIA-510	570423011	NDIR	27-Mar-2014

THIS STANDARD IS NIST TRACEABLE. IT WAS CERTIFIED ACCORDING TO THE 2012 EPA PROTOCOL PROCEDURES. DO NOT USE THIS STANDARD IF THE CYLINDER PRESSURE IS LESS THAN 100 PSIG.

ANALYST: _____ Linde Gas North America LLC **DATE:** 01-Apr-2014

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CERTIFICATE OF ANALYSIS

EPA PROTOCOL MIXTURE

PROCEDURE # : G1

PGVP ID#:	I12013	**GAS CODE:**	SNC
CUSTOMER:	CEM SERVICES	**CYLINDER # :**	CC-113905
SALES#:	110268633	**CYLINDER PRES:**	2000 PSIG
PROD#:	1254602	**CYLINDER VALVE:**	CGA 660
P.O.# :	041013KM	**CYLINDER SIZE:**	2A
MATERIAL#:	24086350	**CYLINDER MATERIAL:**	Aluminum
CERTIFICATION DATE:	02-May-2013	**GAS VOLUME:**	4000 Liter
EXPIRATION DATE:	03-May-2017	**BLEND TOLERANCE:**	5% Relative
(Using the May 2012 Revision of the EPA Protocol)		**PAGE:**	1 of 1

CERTIFICATION HISTORY

COMPONENT	DATE OF ASSAY	MEAN CONCENTRATION	CERTIFIED CONCENTRATION	ANALYTICAL ACCURACY
Sulfur Dioxide	25-Apr-2013 02-May-2013	48.4 ppm 48.7 ppm	48.6 ppm	+/- 1%
Carbon Monoxide	16-Apr-2013	47.0 ppm	47.0 ppm	+/- 1%
Nitric Oxide	25-Apr-2013 02-May-2013	53.0 ppm 53.1 ppm	53.1 ppm	+/- 1%
NOx			53.1 ppm	Reference Value Only

BALANCE Nitrogen

PREVIOUS CERTIFICATION DATES: None

REFERENCE STANDARDS

COMPONENT	SRM/NTRM#	CYLINDER#	CONCENTRATION
Sulfur Dioxide	GMIS-1	CC-65793	101 ppm
Carbon Monoxide	GMIS-1	cc-88590	96.8 ppm
Nitric Oxide	GMIS-1	CC-278874	100.7 ppm

INSTRUMENTATION

COMPONENT	MAKE/MODEL	SERIAL #	DETECTOR	CALIBRATION DATE(S)
Sulfur Dioxide	Horiba VIA-510	851221093	NDIR	02-May-2013
Carbon Monoxide	Horiba VIA-510	570423011	NDIR	19-Mar-2013
Nitric Oxide	CAI 400-CLD	6L09004	Chemi	02-May-2013

THIS STANDARD IS NIST TRACEABLE. IT WAS CERTIFIED ACCORDING TO THE 1997 EPA PROTOCOL PROCEDURES. DO NOT USE THIS STANDARD IF THE CYLINDER PRESSURE IS LESS THAN 100 PSIG.

ANALYST: _____ Linde Gas North America LLC **DATE:** 02-May-2013

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EPA PROTOCOL MIXTURE

PROCEDURE # : G1

PGVP ID#:	I12013	**GAS CODE:**	APPVD
CUSTOMER:	CEM SERVICES	**CYLINDER # :**	CC-98853
SALES#:	110700714	**CYLINDER PRES:**	2000 PSIG
PROD#:	1267502	**CYLINDER VALVE:**	CGA 590
P.O.# :	0807131KM	**CYLINDER SIZE:**	2A
MATERIAL#:	24087589	**CYLINDER MATERIAL:**	Aluminum
CERTIFICATION DATE:	28-Aug-2013	**GAS VOLUME:**	4000 Liter
EXPIRATION DATE:	29-Aug-2021	**BLEND TOLERANCE:**	5% Relative
		PAGE:	1 of 1

CERTIFICATION HISTORY

COMPONENT	DATE OF ASSAY	MEAN CONCENTRATION	CERTIFIED CONCENTRATION	UNCERTAINTY AT 95% CONFIDENCE
Methane	28-Aug-2013	90.58 ppm	90.58 ppm	± 0.93 ppm

BALANCE Air

PREVIOUS CERTIFICATION DATES: None

REFERENCE STANDARDS

COMPONENT	SRM/NTRM#	CYLINDER#	CONCENTRATION	EXPIRATION DATE
Methane	GMIS-964407 SRM 2751 212-C-23	cc-53279 ff-23130	99.10 ± 0.66 ppm 98.23 ± 0.52 ppm	19-Apr-2014 01-Jun-2016

INSTRUMENTATION

COMPONENT	MAKE/MODEL	SERIAL #	DETECTOR	CALIBRATION DATE(S)
Methane	Horiba Via-510	57141706	NDIR	08-Aug-2013

THIS STANDARD IS NIST TRACEABLE. IT WAS CERTIFIED ACCORDING TO THE 2012 EPA PROTOCOL PROCEDURES. DO NOT USE THIS STANDARD IF THE CYLINDER PRESSURE IS LESS THAN 100 PSIG.

ANALYST: _____ **DATE:** 28-Aug-2013

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EPA PROTOCOL MIXTURE

PROCEDURE # : G1

PGVP ID#:	I12013	**GAS CODE:**	APPVD
CUSTOMER:	Cem Services	**CYLINDER # :**	CC-38298
SALES#:	110829885	**CYLINDER PRES:**	2000 PSIG
PROD#:	1271339	**CYLINDER VALVE:**	CGA 590
P.O.# :	091213KM	**CYLINDER SIZE:**	2A
MATERIAL#:	24086346	**CYLINDER MATERIAL:**	Aluminum
CERTIFICATION DATE:	27-Sep-2013	**GAS VOLUME:**	4000 Liter
EXPIRATION DATE:	28-Sep-2021	**BLEND TOLERANCE:**	5% Relative
		PAGE:	1 of 1

CERTIFICATION HISTORY

COMPONENT	DATE OF ASSAY	MEAN CONCENTRATION	CERTIFIED CONCENTRATION	UNCERTAINTY AT 95% CONFIDENCE
Methane	27-Sep-2013	56.64 ppm	56.64 ppm	± 0.60 ppm

BALANCE Air

PREVIOUS CERTIFICATION DATES: None

REFERENCE STANDARDS

COMPONENT	SRM/NTRM#	CYLINDER#	CONCENTRATION	EXPIRATION DATE
Methane	GMIS-964407 SRM 2751 212-C-23	cc-53279 ff-23130	99.10 ± 0.66 ppm 98.23 ± 0.52 ppm	19-Apr-2014 01-Jun-2016

INSTRUMENTATION

COMPONENT	MAKE/MODEL	SERIAL #	DETECTOR	CALIBRATION DATE(S)
Methane	Horiba Via-510	57141706	NDIR	10-Sep-2013

THIS STANDARD IS NIST TRACEABLE. IT WAS CERTIFIED ACCORDING TO THE 2012 EPA PROTOCOL PROCEDURES. DO NOT USE THIS STANDARD IF THE CYLINDER PRESSURE IS LESS THAN 100 PSIG.

ANALYST: _____ **DATE:** 27-Sep-2013

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EPA PROTOCOL MIXTURE

PROCEDURE # : G1

PGVP ID#:	I12014	**GAS CODE:**	APPVD
CUSTOMER:	Cem Services	**CYLINDER # :**	CC-106991
SALES#:	112155443	**CYLINDER PRES:**	2000 PSIG
PROD#:	1315064	**CYLINDER VALVE:**	CGA 590
P.O.# :	100714KM	**CYLINDER SIZE:**	2A
MATERIAL#:	24086346	**CYLINDER MATERIAL:**	Aluminum
CERTIFICATION DATE:	28-Oct-2014	**GAS VOLUME:**	4000 Liters
EXPIRATION DATE:	29-Oct-2022	**BLEND TOLERANCE:**	5% Relative
		PAGE:	1 of 1

CERTIFICATION HISTORY

COMPONENT	DATE OF ASSAY	MEAN CONCENTRATION	CERTIFIED CONCENTRATION	UNCERTAINTY AT 95% CONFIDENCE
Methane	28-Oct-2014	30.68 ppm	30.68 ppm	± 0.23 ppm

BALANCE Air

PREVIOUS CERTIFICATION DATES: None

REFERENCE STANDARDS

COMPONENT	SRM/NTRM#	CYLINDER#	CONCENTRATION	EXPIRATION DATE
Methane	GMIS-269497 SRM 2751 212-C-23	cc-128487 ff-23130	101.10 ± 0.55 ppm 98.23 ± 0.52 ppm	09-Oct-2015 01-Jun-2016

INSTRUMENTATION

COMPONENT	MAKE/MODEL	SERIAL #	DETECTOR	CALIBRATION DATE(S)
Methane	H. Packard 6890	US00001434	GC - FID	28-Oct-2014

THIS STANDARD IS NIST TRACEABLE. IT WAS CERTIFIED ACCORDING TO THE 2012 EPA PROTOCOL PROCEDURES. DO NOT USE THIS STANDARD IF THE CYLINDER PRESSURE IS LESS THAN 100 PSIG.

ANALYST: _____ **DATE:** 28-Oct-2014

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EPA PROTOCOL MIXTURE

PROCEDURE # : G1

PGVP ID#:	I12012	**GAS CODE:**	NO2
CUSTOMER:	CEM SERVICES	**CYLINDER # :**	CC-118443
SALES#:	109475072	**CYLINDER PRES:**	2000 PSIG
PROD#:	1231335	**CYLINDER VALVE:**	CGA 660
P.O.# :	090612KM	**CYLINDER SIZE:**	2A
MATERIAL#:	24087475	**CYLINDER MATERIAL:**	Aluminum
CERTIFICATION DATE:	26-Sep-2012	**GAS VOLUME:**	4000 Liter
EXPIRATION DATE:	27-Sep-2018	**BLEND TOLERANCE:**	5% Relative
		PAGE:	1 of 1

CERTIFICATION HISTORY

COMPONENT	DATE OF ASSAY	MEAN CONCENTRATION	CERTIFIED CONCENTRATION	ANALYTICAL ACCURACY
Nitrogen Dioxide	19-Sep-2012 26-Sep-2012	48.4 ppm 48.2 ppm	48.3 ppm	+/- 2%

BALANCE Air

PREVIOUS CERTIFICATION DATES: None

REFERENCE STANDARDS

COMPONENT	SRM/NTRM#	CYLINDER#	CONCENTRATION
Nitrogen Dioxide	GMIS-1	CC-85056	100.0 ppm

INSTRUMENTATION

COMPONENT	MAKE/MODEL	SERIAL #	DETECTOR	CALIBRATION DATE(S)
Nitrogen Dioxide	Thermo 42i-HL	621417605	Cheml	10-Sep-2012

THIS STANDARD IS NIST TRACEABLE. IT WAS CERTIFIED ACCORDING TO THE EPA PROTOCOL PROCEDURES.
DO NOT USE THIS STANDARD IF THE CYLINDER PRESSURE IS LESS THAN 100 PSIG.

ANALYST: _____ **DATE:** 26-Sep-2012

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EPA PROTOCOL MIXTURE

PROCEDURE # : G1

PGVP ID#:	I12012	**GAS CODE:**	SNC
CUSTOMER:	CEM SERVICES	**CYLINDER # :**	CC-110180
SALES#:	108683171	**CYLINDER PRES:**	2000 PSIG
PROD#:	1205244	**CYLINDER VALVE:**	CGA 660
P.O.# :	011212KM	**CYLINDER SIZE:**	2A
MATERIAL#:	24086350	**CYLINDER MATERIAL:**	Aluminum
CERTIFICATION DATE:	02-Feb-2012	**GAS VOLUME:**	4000 Liter
EXPIRATION DATE:	03-Feb-2020	**BLEND TOLERANCE:**	5% Relative
(using the May 2012 revision of the EPA Protocol)		**PAGE:**	1 of 1

CERTIFICATION HISTORY

COMPONENT	DATE OF ASSAY	MEAN CONCENTRATION	CERTIFIED CONCENTRATION	ANALYTICAL ACCURACY
Nitric Oxide	26-Jan-2012 02-Feb-2012	984.4 ppm 984.8 ppm	985 ppm	+/- 1%
NOx			985 ppm	Reference Value Only
Sulfur Dioxide	26-Jan-2012 02-Feb-2012	977.6 ppm 979.6 ppm	979 ppm	+/- 1%
Carbon Monoxide	23-Jan-2012 01-Feb-2012	1006 ppm 1006 ppm	1006 ppm	+/- 1%

BALANCE Nitrogen

PREVIOUS CERTIFICATION DATES: None

REFERENCE STANDARDS

COMPONENT	SRM/NTRM#	CYLINDER#	CONCENTRATION
Nitric Oxide	GMIS-1	CC-113964	1000 ppm
Sulfur Dioxide	NTRM-81662	CC-172613	990 ppm
Carbon Monoxide	GMIS-1	cc-279074	995 ppm

INSTRUMENTATION

COMPONENT	MAKE/MODEL	SERIAL #	DETECTOR	CALIBRATION DATE(S)
Nitric Oxide	CAI 400-CLD	6L09004	Cheml	20-Jan-2012
Sulfur Dioxide	Horiba VIA-510	851221093	NDIR	26-Jan-2012
Carbon Monoxide	Horiba VIA-510	570423011	NDIR	30-Jan-2012

THIS STANDARD IS NIST TRACEABLE. IT WAS CERTIFIED ACCORDING TO THE 1997 EPA PROTOCOL PROCEDURES. DO NOT USE THIS STANDARD IF THE CYLINDER PRESSURE IS LESS THAN 100 PSIG.

ANALYST: JUSTIN KUTZ

Linde Gas North America LLC

DATE: 02-Feb-2012

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EPA PROTOCOL MIXTURE

PROCEDURE # : G1

PGVP ID#:	I12012	**GAS CODE:**	SNC
CUSTOMER:	CEM SERVICES	**CYLINDER # :**	CC-143547
SALES#:	108683171	**CYLINDER PRES:**	2000 PSIG
PROD#:	1205243	**CYLINDER VALVE:**	CGA 660
P.O.# :	011212KM	**CYLINDER SIZE:**	2A
MATERIAL#:	24086350	**CYLINDER MATERIAL:**	Aluminum
CERTIFICATION DATE:	02-Feb-2012	**GAS VOLUME:**	4000 Liter
EXPIRATION DATE:	03-Feb-2020	**BLEND TOLERANCE:**	5% Relative
(using the May 2012 revision of the EPA protocol)		**PAGE:**	1 of 1

CERTIFICATION HISTORY

COMPONENT	DATE OF ASSAY	MEAN CONCENTRATION	CERTIFIED CONCENTRATION	ANALYTICAL ACCURACY
Nitric Oxide	26-Jan-2012 02-Feb-2012	1974 ppm 1969 ppm	1971 ppm	+/- 1%
NOx			1976 ppm	Reference Value Only
Sulfur Dioxide	25-Jan-2012 01-Feb-2012	1977 ppm 1972 ppm	1975 ppm	+/- 1%
Carbon Monoxide	23-Jan-2012 01-Feb-2012	1944 ppm 1945 ppm	1944 ppm	+/- 1%

BALANCE Nitrogen

PREVIOUS CERTIFICATION DATES: None

REFERENCE STANDARDS

COMPONENT	SRM/NTRM#	CYLINDER#	CONCENTRATION
Nitric Oxide	GMIS-1	CC-241902	2506 ppm
Sulfur Dioxide	GMIS-1	CC-230177	2736 ppm
Carbon Monoxide	GMIS-1	cc-106847	5021 ppm

INSTRUMENTATION

COMPONENT	MAKE/MODEL	SERIAL #	DETECTOR	CALIBRATION DATE(S)
Nitric Oxide	Thermo 42i-HL	621417605	Chemi	26-Jan-2012
Sulfur Dioxide	Nicolet 560	ADL9600109	FTIR	04-Jan-2012
Carbon Monoxide	Horiba VIA-510	570423011	NDIR	30-Jan-2012

THIS STANDARD IS NIST TRACEABLE. IT WAS CERTIFIED ACCORDING TO THE 1997 EPA PROTOCOL PROCEDURES. DO NOT USE THIS STANDARD IF THE CYLINDER PRESSURE IS LESS THAN 100 PSIG.

ANALYST: JUSTIN KUTZ

Linde Gas North America LLC

DATE: 02-Feb-2012

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TEST RUN 1

	RUN 1	27104 SCFH IN			322866 SCFH OU	
COMPOUND	INLET ug/m³	OUTLET ug/m³	Conc. DE %	INLET lb/hr	OUTLET lb/hr	Load DE %
Dichlorodifluoromethane (FREON 12)	593	*17.8*	97	0.0010	0.0004	64
1,2-Dichlorotetrafluoroethane	846	22.0	97	0.0014	0.0004	69
Chloromethane	129	15.7	88	0.0002	0.0003	-45
Vinyl Chloride	2240	45.1	98	0.0038	0.0009	76
Chloroethane	314	*14.2*	95	0.0005	0.0003	46
1,3-Butadiene	ND	52.8			0.0011	
Acetone (2-Propanone)	16000	6493	59	0.0270	0.1307	-383
Methyl Ethyl Ketone (2-Butanone)	12667	167	99	0.0214	0.0034	84
cis-1,2-Dichloroethylene	2190	35.4	98	0.0037	0.0007	81
Chloroform	ND	17.3			0.0003	
1,1-Dichloroethane	717	*14.6*	98	0.0012	0.0003	76
Trichloroethylene	374	*29*	92	0.0006	0.0006	8
Tetrachloroethylene	632	*24.4*	96	0.0011	0.0005	54
Benzene	7840	329	96	0.0133	0.0066	50
Toluene	136200	5900	96	0.2302	0.1188	48
Ethylbenzene	34767	380	99	0.0588	0.0077	87
p+m-Xylene	60233	466	99	0.1018	0.0094	91
o-Xylene	14900	114	99	0.0252	0.0023	91
Styrene	441	22.2	95	0.0007	0.0004	40
4-ethyltoluene	ND	ND				
1,3,5-Trimethylbenzene	2580	*44.2*	98	0.0044	0.0009	80
1,2,4-Trimethylbenzene	4910	*44.2*	99	0.0083	0.0009	89
Chlorobenzene	1210	24.5	98	0.0020	0.0005	76
1,4-Dichlorobenzene	1080	*43.3*	96	0.0018	0.0009	52
Hexane	8830	188	98	0.0149	0.0038	75
Heptane	4980	59.3	99	0.0084	0.0012	86
Cyclohexane	3610	49.6	99	0.0061	0.0010	84
Total Xylenes	72300	580	99	0.1222	0.0117	90
Propene	8160	749	91	0.0138	0.0151	-9
2,2,4-Trimethylpentane	490	*16.8*	97	0.0008	0.0003	59

Note – A complete list of all TO-15 VOC results is presented in Appendix E of Test Report. The compounds shown above are compounds above the detection limit. If an inlet value was above the detection limit and the outlet value was below, the detection limit value was used to calculate the destruction efficiency (DE). The TO-15 train consisted of a mini impinger with 20 ml of water before the canister to knock out any moisture. The values in the above table are the addition of the concentrations found in gas and impinger water (if above detection limit).

TEST RUN 2

	RUN 2	27108 SCFH IN			322883 SCFH OU	
COMPOUND	INLET ug/m³	OUTLET ug/m³	Conc. DE %	INLET lb/hr	OUTLET lb/hr	Load DE %
Dichlorodifluoromethane (FREON 12)	595	*18.8*	97	0.0010	0.0004	62
1,2-Dichlorotetrafluoroethane	850	22.9	97	0.0014	0.0005	68
Chloromethane	ND	12.7			0.0003	
Vinyl Chloride	2280	51.3	98	0.0039	0.0010	73
Chloroethane	295	*15*	95	0.0005	0.0003	39
1,3-Butadiene	ND	44.7			0.0009	
Acetone (2-Propanone)	12000	817	93	0.0203	0.0165	19
Methyl Ethyl Ketone (2-Butanone)	ND	ND				
cis-1,2-Dichloroethylene	2120	39	98	0.0036	0.0008	78
Chloroform	ND	19.2			0.0004	
1,1-Dichloroethane	772	*15.4*	93	0.0013	0.0003	76
Trichloroethylene	422	*30.6*	93	0.0007	0.0006	14
Tetrachloroethylene	622	*25.8*	96	0.0011	0.0005	51
Benzene	7450	361	95	0.0126	0.0073	42
Toluene	105267	5360	95	0.1780	0.1079	39
Ethylbenzene	33593	257	99	0.0568	0.0052	91
p+m-Xylene	58433	466	99	0.0988	0.0094	91
o-Xylene	14900	284	98	0.0252	0.0057	77
Styrene	405	17.3	96	0.0007	0.0003	49
4-ethyltoluene	1980	*205*	90	0.0033	0.0041	-23
1,3,5-Trimethylbenzene	2530	*46.7*	98	0.0043	0.0009	78
1,2,4-Trimethylbenzene	4820	*46.7*	99	0.0081	0.0009	88
Chlorobenzene	1220	27.8	98	0.0021	0.0006	73
1,4-Dichlorobenzene	1060	*45.7*	96	0.0018	0.0009	49
Hexane	7140	233	97	0.0121	0.0047	61
Heptane	4680	60.9	99	0.0079	0.0012	85
Cyclohexane	3410	46.4	99	0.0058	0.0009	84
Total Xylenes	70800	360	99	0.1197	0.0072	94
Propene	7760	759	90	0.0131	0.0153	-17
2,2,4-Trimethylpentane	366	*17.8*	95	0.0006	0.0004	42

Note – A complete list of all TO-15 VOC results is presented in Appendix E of Test Report. The compounds shown above are compounds above the detection limit. If an inlet value was above the detection limit and the outlet value was below, the detection limit value was used to calculate the destruction efficiency (DE). The TO-15 train consisted of a mini impinger with 20 ml of water before the canister to knock out any moisture. The values in the above table are the addition of the concentrations found in gas and impinger water (if above detection limit).

TEST RUN 3

	RUN 3	27223 SCFH IN			322885 SCFH OU	
COMPOUND	INLET ug/m³	OUTLET ug/m³	Conc. DE %	INLET lb/hr	OUTLET lb/hr	Load DE %
Dichlorodifluoromethane (FREON 12)	683	17.0	98	0.0012	0.0003	70
1,2-Dichlorotetrafluoroethane	975	24.2	98	0.0017	0.0005	71
Chloromethane	ND	8.52			0.0002	
Vinyl Chloride	2730	60.7	98	0.0046	0.0012	74
Chloroethane	351	1.2	100	0.0006	0.0000	96
1,3-Butadiene	ND	38.8			0.0008	
Acetone (2-Propanone)	12667	103	99	0.0215	0.0021	90
Methyl Ethyl Ketone (2-Butanone)	ND	ND				
cis-1,2-Dichloroethylene	2670	52.8	98	0.0045	0.0011	77
Chloroform	ND	ND				
1,1-Dichloroethane	933	*0.809*	100	0.0016	0.0000	99
Trichloroethylene	476	10.9	98	0.0008	0.0002	73
Tetrachloroethylene	748	20.1	97	0.0013	0.0004	68
Benzene	8940	523	94	0.0152	0.0105	31
Toluene	136000	2124	98	0.2309	0.0428	81
Ethylbenzene	42500	388	99	0.0722	0.0078	89
p+m-Xylene	73833	398	99	0.1253	0.0080	94
o-Xylene	18177	101	99	0.0309	0.0020	93
Styrene	514	36.6	93	0.0009	0.0007	16
4-ethyltoluene	2540	*10.8*	100	0.0043	0.0002	95
1,3,5-Trimethylbenzene	3200	5.53	100	0.0054	0.0001	98
1,2,4-Trimethylbenzene	6260	3.42	100	0.0106	0.0001	99
Chlorobenzene	1590	46.9	97	0.0027	0.0009	65
1,4-Dichlorobenzene	1430	63.4	96	0.0024	0.0013	47
Hexane	9180	116	99	0.0156	0.0023	85
Heptane	5710	77.4	99	0.0097	0.0016	84
Cyclohexane	4150	51.3	99	0.0070	0.0010	85
Total Xylenes	89600	485	99	0.1521	0.0098	94
Propene	9300	1110	88	0.0158	0.0224	-42
2,2,4-Trimethylpentane	480	6.89	99	0.0008	0.0001	83

Note – A complete list of all TO-15 VOC results is presented in Appendix E of Test Report. The compounds shown above are compounds above the detection limit. If an inlet value was above the detection limit and the outlet value was below, the detection limit value was used to calculate the destruction efficiency (DE). The TO-15 train consisted of a mini impinger with 20 ml of water before the canister to knock out any moisture. The values in the above table are the addition of the concentrations found in gas and impinger water (if above detection limit).

AVERAGE DESTRUCTION EFFICIENCY

	Concentration Basis ug/m³			Load Basis lb / hr		
COMPOUND	INLET AVERAGE	OUTLET AVERAGE	DE %	INLET AVERAGE	OUTLET AVERAGE	DE %
Dichlorodifluoromethane (FREON 12)	624	18	97	0.0011	0.0004	66
1,2-Dichlorotetrafluoroethane	890	23	97	0.0015	0.0005	69
Chloromethane	129	12	90	0.0002	0.0002	-14
Vinyl Chloride	2417	52	98	0.0041	0.0011	74
Chloroethane	320	10	97	0.0005	0.0002	62
1,3-Butadiene		45			0.0009	
Acetone (2-Propanone)	13556	2471	82	0.0229	0.0498	-117
Methyl Ethyl Ketone (2-Butanone)	12667	167	99	0.0214	0.0034	84
cis-1,2-Dichloroethylene	2327	42	98	0.0039	0.0009	78
Chloroform		18			0.0004	
1,1-Dichloroethane	807	10	99	0.0014	0.0002	85
Trichloroethylene	424	24	94	0.0007	0.0005	34
Tetrachloroethylene	667	23	96	0.0011	0.0005	58
Benzene	8077	404	95	0.0137	0.0081	40
Toluene	125822	4461	96	0.2130	0.0898	58
Ethylbenzene	36953	342	99	0.0626	0.0069	89
p+m-Xylene	64166	443	99	0.1086	0.0089	92
o-Xylene	15992	166	99	0.0271	0.0033	88
Styrene	453	25	94	0.0008	0.0005	33
4-ethyltoluene	2260	108	95	0.0038	0.0022	43
1,3,5-Trimethylbenzene	2770	32	99	0.0047	0.0006	86
1,2,4-Trimethylbenzene	5330	31	99	0.0090	0.0006	93
Chlorobenzene	1340	33	98	0.0023	0.0007	71
1,4-Dichlorobenzene	1190	51	96	0.0020	0.0010	49
Hexane	8383	179	98	0.0142	0.0036	75
Heptane	5123	66	99	0.0087	0.0013	85
Cyclohexane	3723	49	99	0.0063	0.0010	84
Total Xylenes	77567	475	99	0.1313	0.0096	93
Propene	8407	873	90	0.0142	0.0176	-23
2,2,4-Trimethylpentane	445	14	97	0.0008	0.0003	63

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TABLE 2 - Emission Rates, ug/m^3

RIDEM Air Toxics Detected in Stack Exhaust *Only detected pollutants are included in this list.*	CASNO	Emission rate, ug/m^3				Scaled Emission rate, ug/m^3		
		Run 1	Run 2	Run 3	Average	1-hr	24-hr	Annual
1,2-Dichlorotetrafluoroethane	76-14-2	22	23	24	23	23.0	13.8	2.3
Chloroethane	75-00-3	14	15	1	10	10.1	6.1	1.0
1,3-Butadiene	106-99-0	53	45	39	45	45.4	27.3	4.5
cis-1,2-Dichloroethylene	156-59-2	35	39	53	42	42.4	25.4	4.2
Chloroform	67-66-3	17	19	ND	18	18.3	11.0	1.8
1,1-Dichloroethane	75-34-3	15	54	1	23	23.1	13.9	2.3
Trichloroethylene	79-01-6	29	31	11	24	23.5	14.1	2.4
Tetrachloroethylene	127-18-4	24	26	20	23	23.4	14.1	2.3
Ethylbenzene	100-41-4	380	257	388	342	341.7	205.0	34.2
Styrene	100-42-5	22	17	37	25	25.4	15.2	2.5
4-Ethyltoluene	622-96-8	ND	205	11	108	107.9	64.7	10.8
1,3,5-Trimethylbenzene	108-67-8	44	47	6	32	32.1	19.3	3.2
1,2,4-Trimethylbenzene	95-63-6	44	47	3	31	31.4	18.9	3.1
1,4-Dichlorobenzene	106-46-7	43	46	63	51	50.8	30.5	5.1
Hexane	110-54-3	188	233	116	179	179.0	107.4	17.9
Heptane	142-82-5	59	61	77	66	65.9	39.5	6.6
2,2,4-Trimethylpentane	540-84-1	17	18	7	14	13.8	8.3	1.4
Acetone (2-propanone)	67-64-1	6493	817	103	2471	2471.0	1482.6	247.1
Benzene	71-43-2	329	361	523	404	404.3	242.6	40.4
Chlorobenzene	108-90-7	25	28	47	33	33.1	19.8	3.3
Chloromethane (methyl chloride)	74-87-3	16	13	9	12	12.3	7.4	1.2
Dichlorodifluoromethane (Freon 12)	75-71-8	18	19	17	18	17.9	10.7	1.8
Hydrochloric Acid	7647-01-0	746	716	895	785	785.4	471.2	78.5
PCDD/PCDF as 2,3,7,8-TCDD (TEQ)	--	4.00E-06	4.00E-06	9.00E-06	5.67E-06	5.67E-06	3.40E-06	5.67E-07
Dioxin-like PCBs as 2,3,7,8-TCDD (TEQ)	--	2.07E-06	4.78E-06	4.24E-06	3.70E-06	3.70E-06	2.22E-06	3.70E-07
Propene (propylene)	115-07-1	749	759	1110	873	872.67	523.60	87.27
Toluene	108-88-3	5900	5360	2124	4461	4461.3	2676.8	446.1
Vinyl Chloride	75-01-4	45	51	61	52	52.4	31.4	5.2
Xylene	1330-20-7	580	360	485	475	475.0	285.0	47.5

Scaling Factor *(Guidelines for Stationary Sources Section 7.1)*	
1-hr	1
24-hr	0.6
Annual	0.1

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TABLE 3 - Emission Rates, ug/m^3 vs. Acceptable Ambient Levels (AALs)

RIDEM Air Toxics Detected in Stack Exhaust *Only detected pollutants are included in this list.*	**CASNO**	**AAL, ug/m^3** *Table I of APCR 22 (2008 version)*			**Scaled Emission > AAL?**	**Adjusted AAL, ug/m^3** *Rhode Island Modeling Guidelines for Stationary Sources, Section 5.9, adjusted for 40 hr/wk exposure*			**Scaled Emission > Adjusted AAL?**
		1-hr	**24-hr**	**Annual**		**1-hr**	**24-hr**	**Annual**	
1,2-Dichlorotetrafluoroethane	76-14-2	None	None	None	No				
Chloroethane	75-00-3	40000	10000	None	No				
1,3-Butadiene	106-99-0	None	None	0.03	Yes, check adjusted AAL	None	None	0.13	Yes
cis-1,2-Dichloroethylene	156-59-2	3000	1000	None	No				
Chloroform	67-66-3	100	None	0.2	Yes, check adjusted AAL	100	None	0.84	Yes
1,1-Dichloroethane (ethylene dichloride)	75-34-3	None	None	0.6	Yes, check adjusted AAL	None	None	2.53	No
Trichloroethylene	79-01-6	10000	500	0.5	Yes, check adjusted AAL	10000	1500	2.11	Yes
Tetrachloroethylene	127-18-4	1000	None	0.2	Yes, check adjusted AAL	1000	None	0.84	Yes
Ethylbenzene	100-41-4	40000	3000	1000	No				
Styrene	100-42-5	9000	1000	100	No				
4-Ethyltoluene	622-96-8	None	None	None	No				
1,3,5-Trimethylbenzene	108-67-8	None	None	None	No				
1,2,4-Trimethylbenzene	95-63-6	None	None	None	No				
1,4-Dichlorobenzene	106-46-7	12000	800	0.09	Yes, check adjusted AAL	12000	2400	0.38	Yes
Hexane	110-54-3	None	None	700	No				
Heptane	142-82-5	None	None	None	No				
2,2,4-Trimethylpentane	540-84-1	None	None	3000	No				
Acetone (2-propanone)	67-64-1	60,000	30,000	None	No				
Benzene	71-43-2	30	20	0.1	Yes, check adjusted AAL	30	60	0.4	Yes
Chlorobenzene	108-90-7	None	None	1,000	No				
Chloromethane (methyl chloride)	74-87-3	1,000	400	90	No				
Dichlorodifluoromethane (Freon 12)	75-71-8	None	None	None	No				
Hydrochloric Acid	7647-01-0	2,000	None	9	Yes, check adjusted AAL	2,000	None	37.9	Yes
PCDD/PCDF as 2,3,7,8-TCDD (TEQ)	--	None	None	3.E-09	Yes, check adjusted AAL	None	None	1.E-08	Yes
Dioxin-like PCBs as 2,3,7,8-TCDD (TEQ)	--	None	None	3.E-09	Yes, check adjusted AAL	None	None	1.E-08	Yes
Propene (propylene)	115-07-1	None	None	3,000	No				
Toluene	108-88-3	4,000	None	300	Yes, check adjusted AAL	4,000	None	1,263	Yes
Vinyl Chloride	75-01-4	1,000	100	0.2	Yes, check adjusted AAL	1,000	None	0.84	Yes
Xylene	1330-20-7	9,000	3,000	100	No				

If permitting is required, a permit cannot be issued unless all pollutants meet the APCR 22 AALs. Pollutants that meet the AAL at the stack would be expected to meet the AAL at the property line. For other pollutants, modeling would be required.

APCR 22.3.3(a): "Except as specified in Subsection 22.3.4, no permit to construct, install or modify will be issued for a stationary source subject to this regulation unless it can be demonstrated, in accordance with the procedures outlined in the Rhode Island Guideline for Air Quality Modeling for Air Toxics Sources, that (a) The emissions of any listed toxic air contaminant from the proposed facility shall not cause an impact, at or beyond the property line of the facility, which exceeds the Acceptable Ambient Levels for that contaminant specified in Table I."

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TABLE 4 - Predicted Impact With 2005 Modeling

RIDEM Air Toxics Detected in Stack Exhaust that Potentially Exceed APCR 22 AALs (* indicates Contaminants of Concern)	CASNO	Average Emission Rate		Predicted Impact, ug/m^3 *emissions, g/s x 2005 unit impact, ug/m^3 per g/s x scaling factor*			AALs, ug/m^3 *APCR 22 Table 1*			Predicted Impact > AAL?
		lb/hr *(ug/m³ x flow dscfm x 0.027 m³ / cf x 60 min/hr ÷ 1000000 ug/g ÷ 454g/lb)*	g/s *(lb/hr x 454 g/lb x hr/3600s)*	1-hr	24-hr	Annual	1-hr	24-hr	Annual	
1,3-Butadiene	106-99-0	8.72E-04	1.10E-04	1.45E-03	8.73E-04	1.45E-04	None	None	0.03	No
Chloroform*	67-66-3	3.50E-04	4.42E-05	5.84E-04	3.51E-04	5.84E-05	100	None	0.2	No
Trichloroethylene*	79-01-6	4.51E-04	5.69E-05	7.53E-04	4.52E-04	7.53E-05	10000	500	0.5	No
Tetrachloroethylene*	127-18-4	4.50E-04	5.67E-05	7.50E-04	4.50E-04	7.50E-05	1000	None	0.2	No
1,4-Dichlorobenzene	106-46-7	9.75E-04	1.23E-04	1.63E-03	9.76E-04	1.63E-04	12000	800	0.09	No
Benzene*	71-43-2	7.76E-03	9.79E-04	1.29E-02	7.77E-03	1.29E-03	30	20	0.1	No
Hydrochloric Acid	7647-01-0	1.67E-02	2.10E-03	2.78E-02	1.67E-02	2.78E-03	2,000	None	9	No
PCDD/PCDF as 2,3,7,8-TCDD (TEQ)	--	8.87E-11	1.12E-11	1.48E-10	8.88E-11	1.48E-11	None	None	3.E-09	No
Dioxin-like PCBs as 2,3,7,8-TCDD (TEQ)	--	7.10E-11	8.95E-12	1.18E-10	7.10E-11	1.18E-11	None	None	3.E-09	No
Toluene*	108-88-3	8.57E-02	1.08E-02	1.43E-01	8.57E-02	1.43E-02	4,000	None	300	No
Vinyl Chloride	75-01-4	1.01E-03	1.27E-04	1.68E-03	1.01E-03	1.68E-04	1,000	100	0.2	No

2005 SCREEN3 modeling results (for perc)	
emission rate (g/s)	2.00E-04
maximum predicted concentration (ug/m^3)	2.65E-03
unit impact (ug/m^3 per g/s)	13.2